INTRODUCTION

"Ucancam User Manual" was written specially for users of Ucancam engraving software. The content in this manual includes installation of the software, editing of text and drawings, object operation, creation and simulation of tool paths, etc.

For the latest information about Ucancam, please visit our website www.ucancam.com.

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“Ucancam User Manual” is provided for users of Ucancam and gives a detailed instruction about installation and operations of Ucancam.

Ucancam has powerful functions and convenient interfaces. It has been widely used in such fields as advertisements, mould-making, sign-making, gift-manufacturing, decoration, art works, woodworking, etc.

There are twelve chapters in this manual, including Ucancam installation, basic operations, shape drawing, object operations, shape editing, text editing, node editing, tool paths, etc.

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1. SYSTEM REQUIREMENTS & INSTALLATION

1.1 System Requirements

- CPU: P4 2.4G or above, or same-level CPU, (preferable Dual-Core or above)
- RAM: 512MB or above, preferable 2GB
- Hard disk: 500M
- Monitor display: resolution 800 600, 256 colors, preferable 1024 768, true color
- CD drive: CD-ROM/DVD driver
- Port: available with Mouse port and USB2.0 port

1.2 Installation Of UCanCam

Don't insert the USB dongle into the USB port of your computer before installation. To install your program and the USB dongle, please follow the procedures step by step.

1 Put the installation disk into the CD-ROM driver.

2 Run the file **wtSetup.exe** in the disk.

3 The initialization interface is shown after running the program. See Fig.1-1.

Fig. 1-1

4 Then the welcoming dialog is shown (Fig.1-2). It is suggested to close other running programs during installation of UCanCam to avoid incorrect installation. (Press Alt +Tab to switch among programs.)

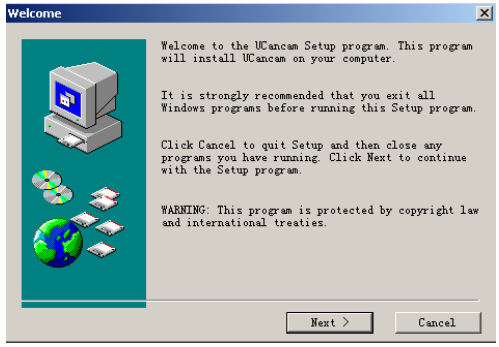
Welcome
Welcome to the UCancam Setup program. This program will install UCancam on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup program.
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Next >
Cancel

Fig.1-2

5 Click Next, and the License Agreement dialog is shown. (Fig.1-3) please read it carefully as this program is protected by copyright law, and any copying or spreading of the program without

authorization from UCanCam Software Technology Co., Ltd is subject to civil and criminal sanction. Click **Yes** to continue installation, and click No to exit installation.

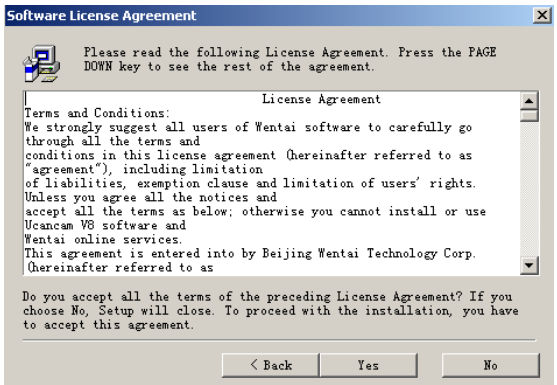
Software License Agreement
Please read the following License Agreement. Press the PAGE DOWN key to see the rest of the agreement.
License Agreement
Terms and Conditions:
We strongly suggest all users of Wentai software to carefully go through all the terms and conditions in this license agreement (hereinafter referred to as "agreement"), including limitation of liabilities, exemption clause and limitation of users' rights. Unless you agree all the notices and accept all the terms as below; otherwise you cannot install or use Ucancam V8 software and Wentai online services.
This agreement is entered into by Beijing Wentai Technology Corp. (hereinafter referred to as
Do you accept all the terms of the preceding License Agreement? If you choose No, Setup will close. To proceed with the installation, you have to accept this agreement.
< Back
Yes
No

Fig. 1-3

6 Click **Yes** and Choose Destination Location dialog is displayed. Click **Next** if you want to install the UCanCam in the default path (Fig.1-4).

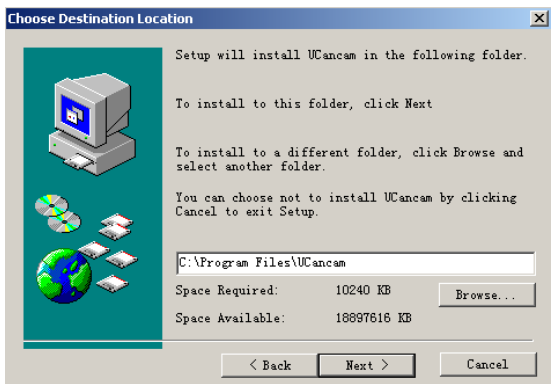
Choose Destination Location
Setup will install UCancam in the following folder.
To install to this folder, click Next
To install to a different folder, click Browse and select another folder.
You can choose not to install UCancam by clicking Cancel to exit Setup.
C:\Program Files\UCancam
Space Required: 10240 KB
Space Available: 18897616 KB
Browse...
< Back
Next >
Cancel

Fig. 1-4

Click **Browse** if you want to change the installation path. Click **OK** to continue.

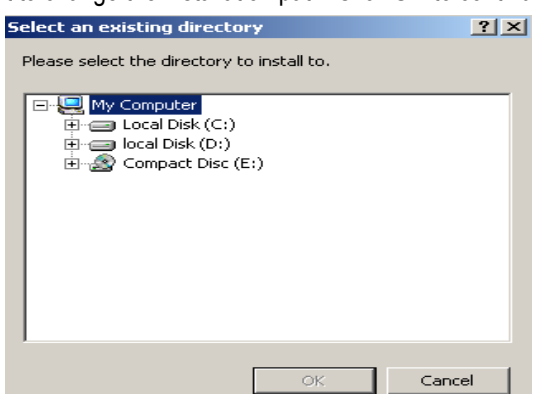

Fig.1-5

7 The program then asks whether you want to create a shortcut icon of UCanCam on the desktop. (Fig.1-6). It is suggested to select **Yes**.

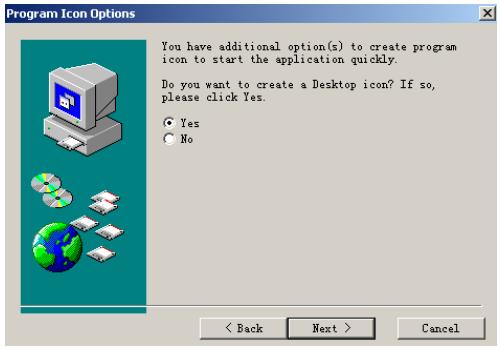
Program Icon Options
You have additional option(s) to create program icon to start the application quickly.
Do you want to create a Desktop icon? If so, please click Yes.
Yes
No
< Back
Next >
Cancel

Fig.1-6

8 Click **Next**, and **Start Copying Files** dialog (Fig.1-7) is shown. The selected installation path and file are shown in the dialog. Click **Back** if you want to change the path and file.

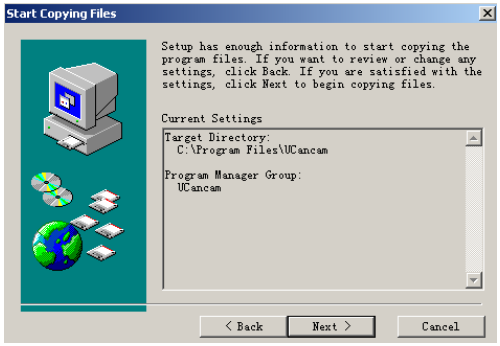
Start Copying Files
Setup has enough information to start copying the program files. If you want to review or change any settings, click Back. If you are satisfied with the settings, click Next to begin copying files.
Current Settings
Target Directory:
C:\Program Files\UCancam
Program Manager Group:
UCancam
< Back
Next >
Cancel

Fig.1-7

9 Click **Next** to start copying files. (Fig.1-8)

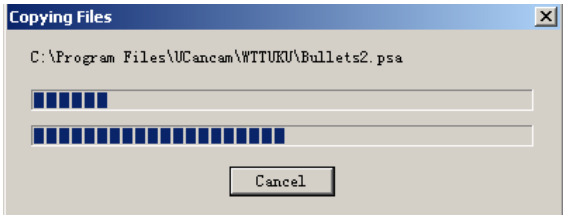

Fig.1-8

10 After copying the file, the installation of USB dongle driver begins automatically.

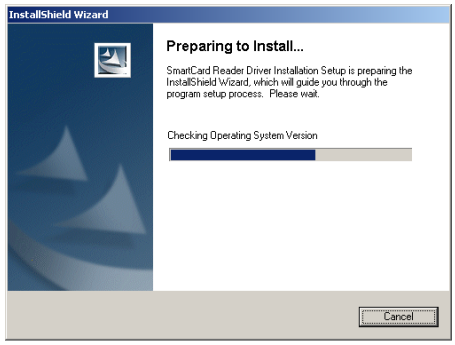
InstallShield Wizard
Preparing to Install...
SmartCard Reader Driver Installation Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.
Checking Operating System Version
Cancel

Fig.1-9

11 After the installation of USB driver, the following dialog displays to indicate that the

installation has been completed. (Fig.1-10)

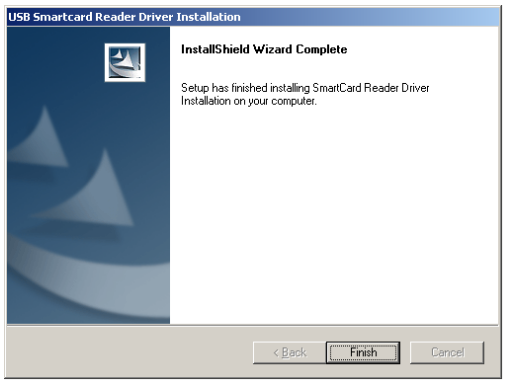

Fig.1-10

12 Click **Finish** and the dialog **Setup Complete** displays. (Fig.1-11)

Fig.1-11

14 Click **Finish** to finish installation.

An icon is formed on desktop.

After confirming that the USB port of your PC is in normal working order, insert the USB dongle into the USB port of your computer, or connect the USB dongle with the computer through USB cable.

You can now work with UCanCam.

Remark：if you get the prompt “not find the dongle”, when run the UCanCam software. Please check wether the dongle is inserted in the USB port. if yes, then check the Device manager in your Windows system. If you see as Fig.1-12, that means the dongle is not installed successlly. You need to restart your system or reinstall the dongle driver.

Open the directory which UCanCam exist in. and open the sub fold Drv, run the file dongleinstall.exe. after finish the installation process. you should see Fig.1-13 in Device Manager, it means the dongle is installed correctly.

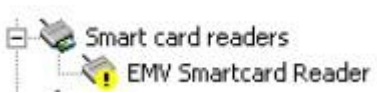

Fig.1-12

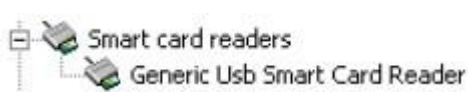

Fig.1-13

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2. BRIEF INTRODUCTION TO UCANCAM

2.1 Brief Introduction

2.1.1 Application

Ucancam, a special application software in CAD (Computer-Aided Design) and CAM (Computer-Aided Manufacturing), is widely used in such areas as advertisements, sign-making, gift manufacturing, decoration, art design, woodworking and mold-manufacturing.

2.1.2 Features

Two types of interface

Both the standard and panel interface are available for users to choose according to your habits.

Node editing

Functions in node editing include: add, delete, disconnect, connect, close, convert to line, convert to curve, smooth, symmetry, align, start point, auto remove points, fillet, and vertical.

Text Editing

Text can be rotated, scaled, moved, sheared, arranged along curves, etc. and they can be edited again in text edit mode after these transformations. Besides, text input in a frame is also available, with automatic line feed.

Serial number text

This function is used with making some designs of serial number texts.

Accurate drawing

Accurate drawing is made easy by means of keyboard input. Feature points such as end points, midpoints, intersection points, perpendicular foot, and tangent points can be snapped.

Editing Tools

Various Editing Tools are provided, including trim, delete, offset, divide, close, simple slice, complex slice, Boolean operation and duplication. Geometrical-shape-transforming tools include move, rotate, scale, mirror, shear, perspective distortion, envelop distortion, twist distortion, push and pull distortion and auto nesting.

Image tracing

Images in various formats can be imported, converted, and stripped. Image tracing is available with Ucancam in order to extract contour. Angle degrees can be adjusted, and accurate tracing parameters such as cusp angle, trace error, fairy number, and threshold of line can be set.

Other aided tools

There are numerous viewing tools which are used to view objects from different viewing angles.

Measuring tools for measuring length, angle, perimeter, size and other tools like ruler, guide line, notepad, and calculator are also available.

Toolpath

Tool paths are calculated quickly and accurately for NC machining. Ucancam provides a **Tools Library** where users can choose, edit, add or delete a tool. Various machining solutions are available. Users can apply toolpath walk simulation to check whether tool paths are valid and to preview machining

results. These simulation functions are also useful to reduce trial cutting times and cut down machining costs and help users to get valid and effective machining results.

2.2 Interface

Both standard and panel interface are available for the users to choose according to your habits.

2.2.1 Standard Interface

Standard interface is the default interface of Ucancam. (Fig. 2-5)

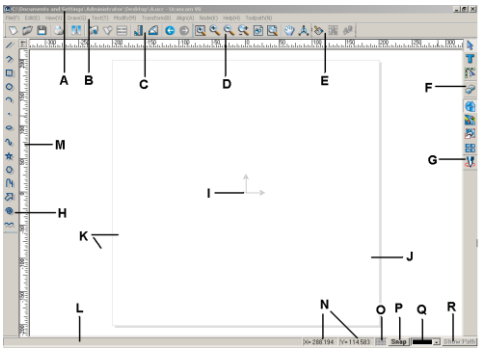


Fig. 2-5

A. Title bar: displays file name or software name on the left; on the right are minimize button, maximize/back button and close button.

B. Menu bar: includes **File, Edit, View, Draw, Text, Modify, Transform, Align, Node, Help, Surface and Tool Path.**

C Standard Bar: displays icons of commonly used tools

D View Bar: displays icons of viewing tools.

E Edit bar: displays icons of editing tools.

F Edit mode tool bar: is for opening or closing tool bars and change editing modes.

G Tool path: displays icons for tool path calculation.

H Draw bar: displays icons for drawing simple shapes

I Coordinates: are references to object positions.

J Page: is the page size.

K Drawing window: is the area for drawing.

L Status bar: displays current operation status and parameters input.

M Ruler: displays actual sizes of objects. It shows in the work interface in default setting.

REMARK Click View->Rulers command to show or hide rulers.

N X / Y Coordinates: Shows coordinates.

O Show/Hide the Grids: Show or hide background Grids.

REMARK Click **View->Grids** to show or hide background Grids.

P Snap setting: Set the types of points to be snapped and control the show and close of the function.

Q Color: is for setting color.

R Hide/Show: Show or hide tool paths.

REMARK Click **View->Tool path** command to show or hide tool paths.

Move the mouse onto any shortcut button, names of shortcut buttons will be shown automatically.

2.2.2 Panel Interface

Panel interface is another interface of Ucancam. With bars in tab form, Ucancam is operated easily and quickly as the interface layout is quite clear. (Fig. 2-6)

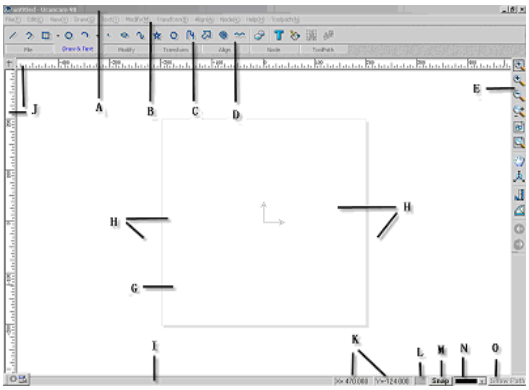


Fig. 2-6

A. Title bar B. Menu bar C. Shortcut button bar
D. Status switch bar E. View tools bar F. Coordinates axes
G. Page H. Drawing window I. Status bar
J. Rulers K. X, Y coordinates L. Show/Hide Grids
M. Snap shortcut icon N. Color O. Show/Hide tool paths

2.3 ToolBar Settings

To switch between the above two kinds of interface, you should open ToolBar settings dialog. Click **View->Toolbars**, and the **ToolBar** Settings dialog displays. (Fig. ig.2-7)

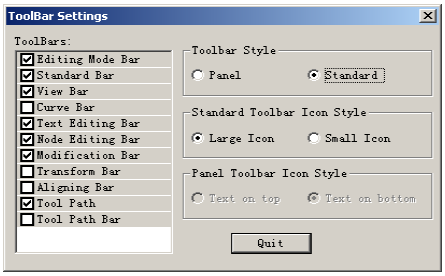


Fig 2-7

Toolbar Style: is to select a style of the interface.

Standard Toolbar Icon Style: is to select Large Icon style or Small Icon style in standard tool bar.

Panel Toolbar Icon Style: is to select an icon style in panel toolbar.

Toolbars: is to select one or more toolbars to be displayed in the interface. To hide a toolbar in the interface, deselect it.

You can save the settings by clicking Quit, or by pressing the Enter key in the keyboard.

Shortcut Icons

Shortcut icons are shortcuts to menu commands. The table below outlines commonly-used shortcut icons in Ucancam.

ICON	FUNCTION	SHORTCUT KEY	LOCATION
	Start a file	Ctrl + N	Standard Bar
	Open a file	Ctrl + O	Standard Bar
	Save a file	Ctrl + S	Standard Bar
	Print	Ctrl + P	Standard Bar
	Design Central		Standard Bar
	Import a file	Ctrl + R	Standard Bar
	Image tracing		Standard Bar
	Image stripping		Standard Bar
	Distance measure		Standard Bar
	Angle measure		Standard Bar
	Undo	Ctrl + Z	Standard Bar
	Redo	Ctrl + Y	Standard Bar
	Line		Curve Bar
	Polyline		Curve Bar
	Rectangle		Curve Bar
	Circle		Curve Bar

	Arc		Curve Bar
	Point		Curve Bar
	Ellipse		Curve Bar
	Spline		Curve Bar
	Star		Curve Bar
	Polygon		Curve Bar
	Combine curve		Curve Bar
	Arrow		Curve Bar
	Spiral		Curve Bar
	Wavy line		Curve Bar
	Rapid input		Text Editing Bar
	Convert to curves		Text Editing Bar
	String alone a curve		Text Editing Bar
	Trim		Modification Bar
	Offset		Modification Bar
	Linear slice		Modification Bar
	Rectangular Slice		Modification Bar
	Ellipse slice		Modification Bar
	Parallel slice		Modification Bar
	Circular slice		Modification Bar

	Radial slice		Modification Bar
	Close		Modification Bar
	Join		Modification Bar
	Common		Modification Bar
	Subtract		Modification Bar
	Not common		Modification Bar
	Group	Ctrl + G	Modification Bar
	Ungroup	Ctrl + U	Modification Bar
	Direction		Modification Bar
	Divide		Modification Bar
	Expand		Modification Bar
	Duplication along a curve		Modification Bar
	Array duplication		Modification Bar
	Duplication along a line		Modification Bar
	Duplication along a arc		Modification Bar
	Duplication along a spiral curve		Modification Bar
	Move		Transform Bar
	Mouse		Transform Bar
	Scale		Transform Bar
	Horizontal mirror		Transform Bar

	Vertical mirror		Transform Bar
	Line mirror		Transform Bar
	Shear		Transform Bar
	Perspective distortion		Transform Bar
	Envelop distortion		Transform Bar
	Push & Pull distortion		Transform Bar
	Twist distortion		Transform Bar
	Auto nesting		Transform Bar
	Align on left	Ctrl + Num4	Aligning Bar
	Align on right	Ctrl + Num6	Aligning Bar
	Align to top	Ctrl + Num8	Aligning Bar
	Align to bottom	Ctrl + Num2	Aligning Bar
	Align on center	Ctrl + Num5	Aligning Bar
	Horizontal aligning	Alt + ,	Aligning Bar
	Vertical aligning	Alt +.	Aligning Bar
	Horizontal spacing	Alt + [	Aligning Bar
	Vertical spacing	Alt +]	Aligning Bar
	Make same width	Ctrl + Alt + W	Aligning Bar
	Make same height	Ctrl + Alt + H	Aligning Bar

	Make same size	Ctrl + Alt + A	Aligning Bar
	Add a node		Node Editing Bar
	Delete a node		Node Editing Bar
	Disconnect		Node Editing Bar
	Connect		Node Editing Bar
	Close		Node Editing Bar
	Convert to line		Node Editing Bar
	Convert to curve		Node Editing Bar
	Cusping		Node Editing Bar
	Smooth		Node Editing Bar
	Symmetry		Node Editing Bar
	Node align		Node Editing Bar
	Start point		Node Editing Bar
	Auto remove points		Node Editing Bar
	Fillet		Node Editing Bar
	Vertical		Node Editing Bar
	Tool management		Tool Path Bar
	Tool path output		Tool Path Bar
	Profile machining		Tool Path Bar
	Area clearance		Tool Path Bar

	3D engraving		Tool Path Bar
	Midline machining		Tool Path Bar
	Drilling		Tool Path Bar
	Insert		Tool Path Bar
	Inlay		Tool Path Bar
	Prism machining		Tool Path Bar
	Intelligent machining		Tool Path Bar
	Embossing machining		Tool Path Bar
	Image relief machining		Tool Path Bar
	Toolpath walk simulation		Tool Path Bar
	Zoom window	F6	View Bar
	Zoom in	Page Up	View Bar
	Zoom out	Page Down	View Bar
	Dynamic zoom	F7	View Bar
	Fit to all	F8	View Bar
	Fit to page	F9	View Bar
	Pan view	F10	View Bar
	3D view	F12	View Bar
	Selection tools		Editing Mode Bar
	Text editing tools	Ctrl + T	Editing Mode Bar

	Node editing tools	Ctrl + K	Editing Mode Bar
	Symbol library	Ctrl + M	Editing Mode Bar
	Draw basic vectors		Editing Mode Bar
	Editing tools		Editing Mode Bar
	Transform		Editing Mode Bar
	Align		Editing Mode Bar
	Tool path		Editing Mode Bar

Toolbars

Toolbars consist of commonly used commands.

Fig.2-8a **Editing Mode Bar**

Fig.2-8b **Standard Bar**

Fig. 2-8c **View Bar**

Fig.2-8d **Curve Bar**

Fig.2-8e **Text Editing Bar**

Fig. 2-8f **Node Editing Bar**

Fig.2-8g **Modification Bar**

Fig.2-8h **Transform Bar**

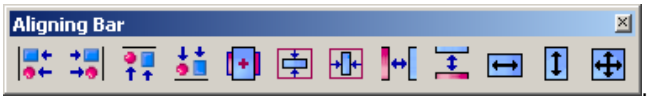


Fig.2-8i **Aligning Bar**

Fig.2-8j **Tool Path Bar**

2.4 Design Central

The function of **Design Central** includes setting page size, modifying elements property, digital positioning, condition select, modifying node coordinates and other operation. Key in parameters and press **Enter** to finish operation. Parameters come into force within 3seconds without pressing **Enter**.

Click on the icon on standard bar or click **File->Design Central** on menu bar. **Design Central** dialog can be shown or hidden. Double-click title bar of **Design Central** or press minimize button, **Design Central** dialog can be contracted, Double-click title bar of **Design Center** again or press maximize button, **Design Central** dialog can be shown .if you select object without opening **Design Central**. **Design Central** dialog will be display automatically.

2.4.1 Page Size

You can set page size at **Design Central** Fig 2-8

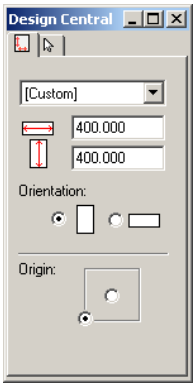


Fig 2-8

1 Custom: you can design the size of page according to you need, you also can select one at drop down list .Fig 2-9

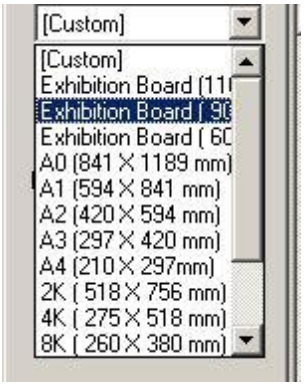

[Custom]
[Custom]
Exhibition Board (11
Exhibition Board (9
Exhibition Board (6
A0 (841 X 1189 mm)
A1 (594 X 841 mm)
A2 (420 X 594 mm)
A3 (297 X 420 mm)
A4 (210 X 297mm)
2K (518 X 756 mm)
4K (275 X 518 mm)
8K (260 X 380 mm)

Fig 2-9

2 Width and height of page: is to show the width and height of page. You can key in the parameters of width and height according to you need.

3 Direction: Portrait and Landscape of page.

4.Origin: you can set the origin point on the center or left corner of the page.

2.4.2 Select By Type

Click **Edit**->**Select By Type** and a dialog is shown .Fig 2-10

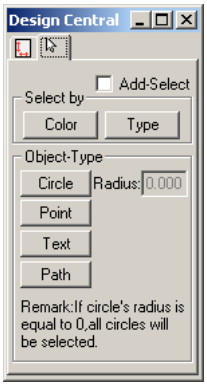


Fig 2-10

Two styles of **Select by** in design central: **Color** and **Type**

Type: you can select object directly, such as text .path and so on. You also can select objects by mouse with **Type** button in dialog,.when cursor become select the object. In this way, all the objects with same type can be selected.

Color: You can select objects by mouse. Click **Color** button in dialog, when cursor become select the object. In this way, all the objects with same color can be selected.

Object-Type: Object-Type includes **Circle, Point, Text, and Path**. Click **Circle, Point, Text, Path** button in dialog, all the relevant type can be selected.

Add-Select: After checking the "√"before **Add-Select**, you can select different type of object at

same time. Such as select rectangle first, after checking the "√"before **Add-Select** and clicking **Circle** button in the dialog, the rectangle and circle are selected at same time. This function is directed towards the objects in **Object-Type**.

2.4.3 Element Property

After selecting an object, you can check or modify its element property at **Design Central** Eg: select a circle, dialog is shown Fig 2-11

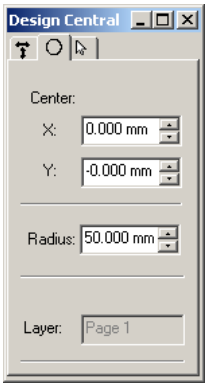


Fig 2-11

The center coordinate of circle, radius of it and layer is shown, key in parameters to change center coordinate of circle and radius of it.

2.4.4 Figure Positioning

Figure positioning function can accurately position the location and set the size of object.

Select one or more objects, **Figure Positioning** dialog is shown automatically in design central, size and pivot points coordinate of objects is shown in dialog Fig 2-12a

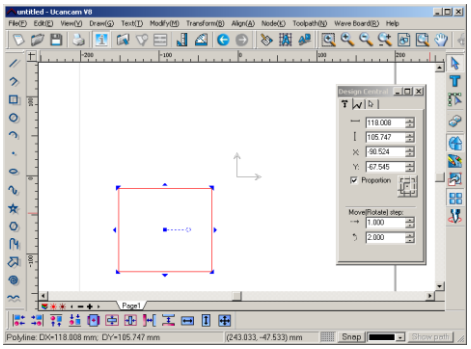


Fig 2-12a

First pick pivot point (Ucancam offer 9 pivot points to choose) ,then key in width and height to change the size of object (you can choose proportion) finally key in x, y coordinate and press **Enter** to finish operation .the size of object and the location of it is changed.

Eg : choose lower-left corner as pivot point , disable **Proportion** ,key in width(100) ,height (100) , x-coordinate (0) , y-coordinate (0)and press **Enter** to finish operation. The result is shown Fig 2-12b. The size is changed to be100*100.Lower-left corner coordinate is at the position (0, 0)

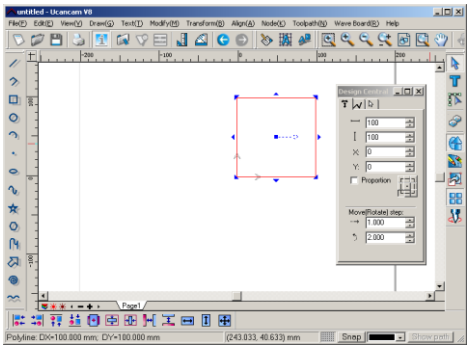


Fig 2-12b

key increment step

If the move in X and Y direction is 1mm each time, and objects move 1mm after selecting objects and pressing arrow keys on the keyboard.

Rotate is for controlling the rotation of objects. Select an object, press the Ctrl key on the keyboard, and press the left or right arrow keys on the keyboard to rotate objects. Anti-clockwise rotation is achieved by pressing the left key and clockwise rotation is achieved by pressing the right key.

3. BASIC OPERATIONS

In this chapter, you will learn something about the basic operations of Ucancam.

3.1 File Operation

3.1.1 Open A File

There are 3 ways to open a file:

- Click on the icon on **Standard Bar**
- Click **File->Open**
- Press **Ctrl+O**.

Then the **Open** dialog displays. (Fig. 3-1)

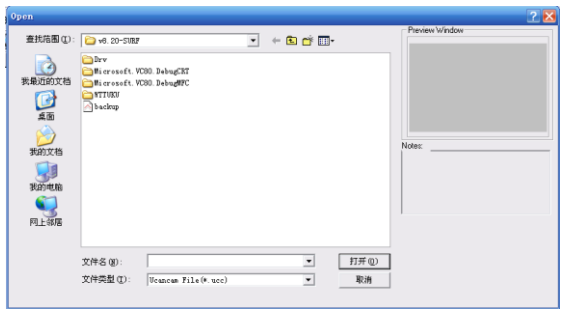


Fig. 3-1

You can choose the path of the file, or enter the file name after **File Name** and you can preview this file in preview window. Click after selecting the file name to open the file.

REMARK The selected file can also be opened by double clicking the file or by pressing the **Enter** key on the keyboard.

3.1.2 New A File

Any of the following three ways can be chosen to create a new file.

- Click on the icon on **Standard Bar**
- Click **File->New**
- Press **Ctrl** + **N**

3.1.3 Save A File

There are three ways to save a file.

- Click on the icon on **Standard Bar**
- Click **File->Save**.
- Press **Ctrl** + **S**.

In case of creating a new file or changing the path of a file, press **Ctrl** +**Shift** +**S** or click **File->Save**

As. Then the dialog **Save As** is shown. (Fig.3-2)

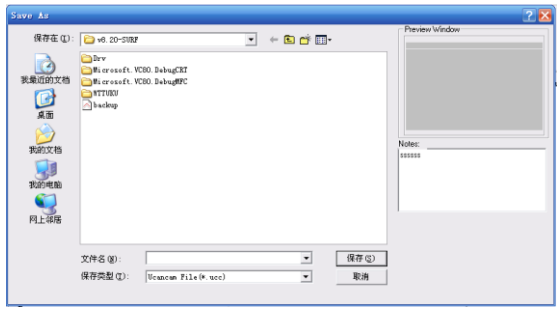


Fig. 3-2

You can select the saving path of the file in the drop down list **Save As Type**, and then input the name of the file and you can preview this file in **preview window**. After selecting the saving path and name of the file, click on Save or press the **Enter** key to save the file.

3.1.4 Import File

Click **File**->**Import File** to import a file to the current page.

The following are file formats that is compatible by Ucancam. (Fig.3-3)

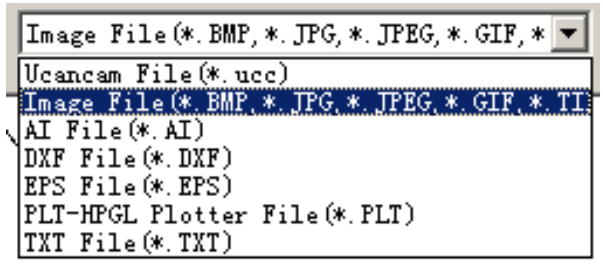


Fig.3-3

Image File:

BMP, JPG, JPEG, TIF, GIF, PNG.

Vector File:

AI File: Adobe Illustrator file format

DXF File: The Drawing Exchange Format (DXF) enables the interchange of drawings between AutoCAD and other programs.

EPS File: Encapsulated PostScript (EPS) is a standard file format for importing and exporting PostScript files.

PLT File: PLT (also HPGL) created by Hewlett-Packard is the standard language for printing line drawings. HPGL is supported by many CAD, charting and word processing applications.

TXT File: ASCII text file.

There are 3 ways to import a file:

- Click on the icon on **Standard Bar.**
- Click **File**->**Import file** in the menu bar
- Press **Ctrl** + **R**.

Then **Import File** dialog displays. (Fig. 3-4)

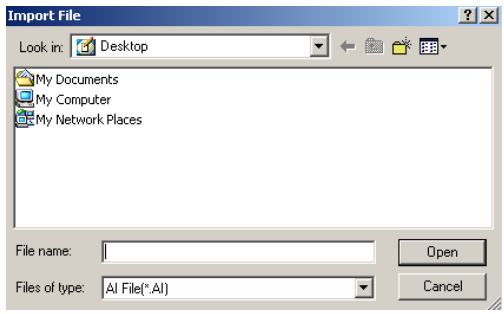


Fig. 3-4

The only difference between **Import File** dialog and **Open** dialog is that you can select other file formats in **Import File** dialog. The file is opened after clicking on it and then clicking on Open or pressing the **Enter** key.

REMARK: Save DXF file at AutoCAD, before read it into, you should turn off the currently occupied document .otherwise; they will be read into the failure. save EPS at IS software, it is necessary to select a low version format, otherwise ,the file which will be read in will become redundant lines, arbitrary lines and so on .

When you want to import a file whose format is not supported by Ucancam, please use other software such as windows paint and Photoshop to convert it to file formats compatible for Ucancam before importing the file. When you use AutoCAD,CorelDraw. Illustrator and other software, you should convert the vector graphics file to the format which is supported by Ucancam, and then operate the file.

3.1.5 Export File

You can save a file into other formats (e.g. DXF, PLT) compatible with other software. Choose the objects to be saved and then click **File**->**Export** on menu bar. Fig 3-5

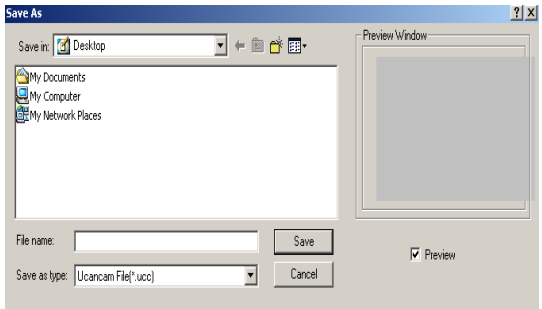


Fig 3-5

You can select file save path at the drop down list of **Save in**. Key in file name at **File name** and select type of file at the drop down list of **Save as type** then press **Save** or press **Enter** on keyboard to save file.

3.1.6 Export The Selected

This function is to save the selected object, and make notes for it.

Select **File->Export the selected** on menu bar, a dialog is shown Fig3-6. Key in file name **File name** and select type of file at the drop down list of **Save as type** then press **Save** or press **Enter** on keyboard to save file.

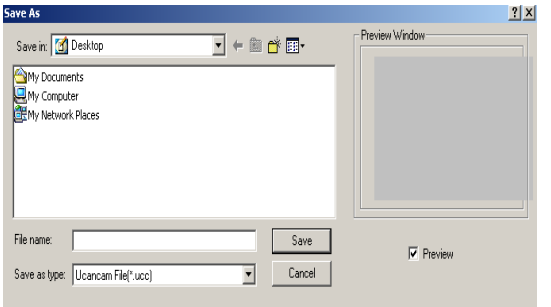


Fig3-6

3.1.7 Print

Before printing a document, it is necessary to install the windows printer driver, and you should confirm computer is connected with the printing devices.

1. Print Setup

Select **File->Print Setup** a dialog is shown, Fig 3-7

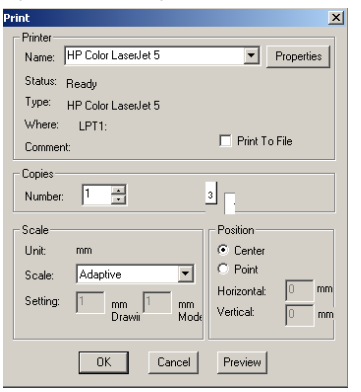


Fig 3-7

Print setting mainly divides into three parts: the printer, copies, position. If you set up many printers, printers connected, you should choose one of them from the drag down list of name. You can set the size, origin and orientation of the paper according to your needs.

REMARK: Printer setting is different according to the brand and type of the printer used. Please refer to the instruction of your printer during setup.

2. Print

The Print dialog is displayed after clicking **File->Print** command (the shortcut key is **Ctrl +P**), or by clicking on the shortcut icon . Fig 3-8

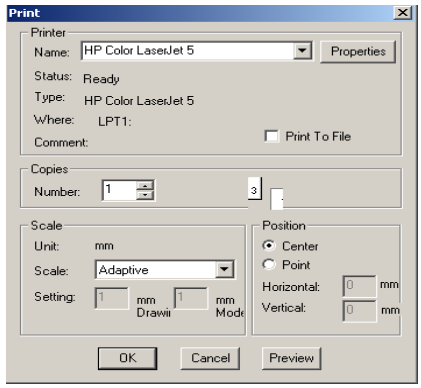


Fig 3-8

Copy: is the number of copies of the file to be printed.

Scale: is the ratio of the size of the drawing to that of the paper. Select the value in the drag down list.

Position: is the location of the page on the paper.

The page can be previewed after clicking **Preview** in the **Print** dialog. (Fig.3-9)

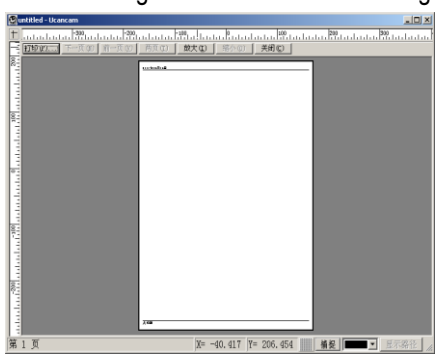


Fig.3-9

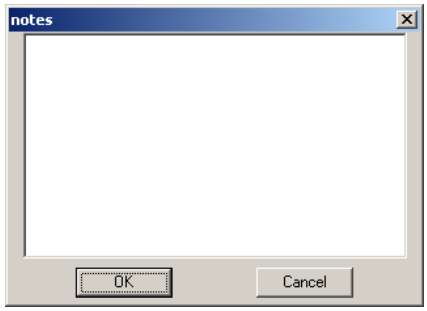
The page can be viewed after being zoomed in previewing module. (The page can be zoomed by four times) Click on OK to print the file. Click on Cancel or Esc key in the keyboard to exit previewing module.

REMARK: The size of the page can be zoomed in by pressing the left mouse button on the page, and the page returns to normal size by pressing the left mouse button again.

3.1.8 Notes

You can make notes when you need.

Click **File->Notes**, then the **Notes** dialog is shown



Making notes and press **Ok** to save notes, you also can press **Cancel** to cancel operation.

REMARK: The notes can be saved with the file, when you open the file, you can check the notes you made.

3.2 Viewing Tools

3.2.1 Zoom Window

Parts of a shape can be viewed closely through **Zoom window**. The following are three ways to start **Zoom window**.

- Click on the icon on **View Bar**.
- Click **View->Zoom window** in the menu bar.
- Press the shortcut key F6.

Then the cursor changes into . Hold the left mouse button and move the cursor to form a view box; release the mouse button, then that part of the object is magnified.

Click the right mouse button in the drawing window to end operation.

3.2.2 Zoom In

The page can be magnified through Zoom in function.

There are three ways to start Zoom in operation.

- Click the icon on **View Bar**.
- Click **View->Zoom in** on the menu bar.
- Press the shortcut key **Page Up**.

The Page is magnified by two times after each operation.

3.2.3 Zoom Out

The page can be minified through **Zoom out** function. This can be achieved in any of the following ways.

- Click the icon on **View Bar**.
- Click **View->Zoom out** on the menu bar.

- Press the shortcut key **Page Down**.

The Page is minified by half after each operation.

3.2.4 Dynamic Zoom

The page can be zoomed in or out through Dynamic zoom operation so that objects can be viewed in different sizes. This can be achieved by any of the following means.

- Click the icon on **View Bar**.
- Click **View**->**Dynamic zoom** on the menu bar.
- Press the shortcut key **F7**.

Then the cursor changes into . Press the left mouse button, and the page is zoomed in by moving the mouse up, and is zoomed out by moving the mouse down.

Click the right mouse button to exit Dynamic zoom operation. The cursor changes into an arrow and the Dynamic zooming effect is saved.

REMARK: If you use 3D mouse, **Dynamic zoom** operation can be achieved by rolling the mouse wheel. The page is zoomed in by rolling the mouse wheel backward and is zoomed out by rolling the mouse wheel forward.

3.2.5 Fit To All

Selected objects can be displayed in the whole window through **Fit to all** function. First select the object(s), and then select one of the following ways.

- Click the icon on **View Bar**.
- Click **View**->**Fit to all**.
- Press the shortcut key **F8**.

REMARK: If no objects are selected before enabling **Fit to all** operation, then all objects in the drawing window will be displayed in the whole view window after **Fit to all** operation. The following is an example when no object is selected.

3.2.6 Fit To Page

Object position in the page can be viewed through **Fit to page** function.

There are 3 ways to start this function.

- Click on the icon on **View Bar**.
- Click **View**->**Fit to page** on the menu bar.
- Press the shortcut key **F9**.

3.2.7 Pan View

The whole Page can be moved so that you can view different parts of the drawing. This can be achieved through any of the following ways.

- Click on the icon on **View Bar**.
- Click **View->Pan view** in the menu bar
- Press the shortcut key **F10**.

Then the cursor changes into , and move the mouse with left button pressed to move the page.

Click on the right mouse button in the drawing window to stop the moving.

3.2.8 3D View

You can view objects in 3D view by **3D view** function.
This can be achieved through any of the following ways.

- Click on the icon in **View Bar**.
- Click **View->3D view** in the menu bar.
- Press the shortcut key **F12**.

After clicking on , the cursor changes into , press the left mouse button to view the object in 3D display. (Fig. 3-10)

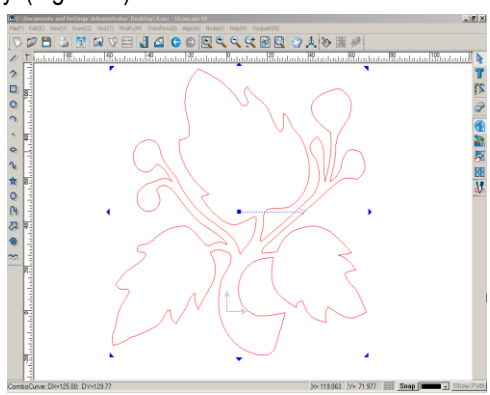


Fig. 3-10a (original)

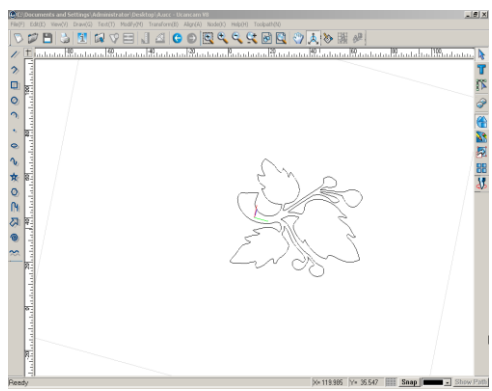


Fig. 3-10b (3D view)

In 3D view mode, click the menu View->View Plan to display .Seven types of 3D view functions：

Top view, Bottom view, Front view, Back view, Left view, **Right view**, and **ISO view**. Next we are to illustrate these functions by taking area clearance tool path as an example. (Fig. 3-11)

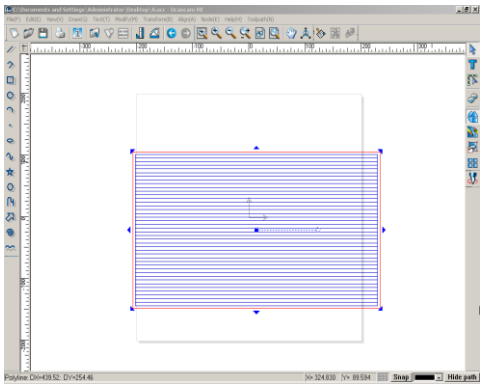


Fig. 3-11a (a rectangle's tool path)

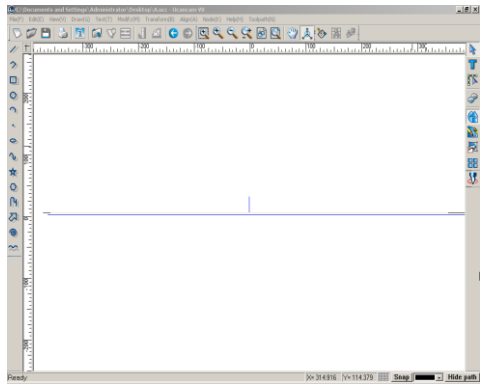


Fig. 3-11 b (front view)

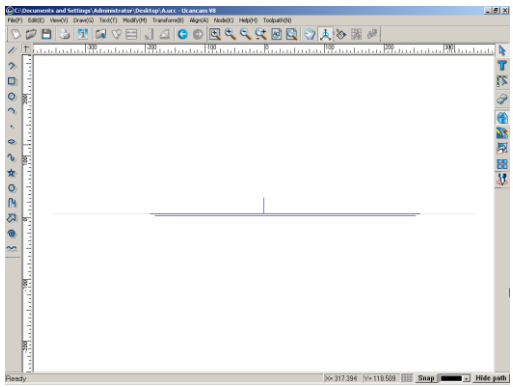


Fig. 3-11 c (left view)

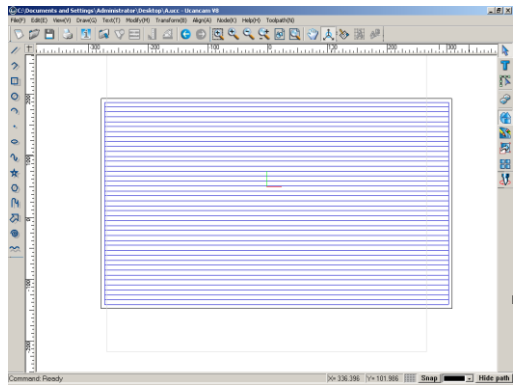


Fig 3-11d (top view)

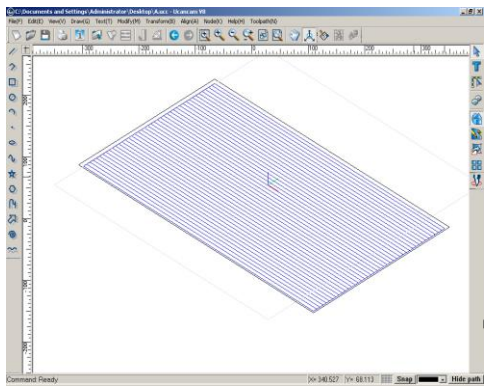


Fig. 3-11e (ISO view)

Seven viewing methods are provided in the context menu, including **Zoom window**, **Zoom in**, **Zoom out**, **Dynamic zoom**, **Pan View**, **Fit to all**, **Fit to page**. Now let's look at effects of these seven view functions in 3D view mode. (Fig. 3-12)

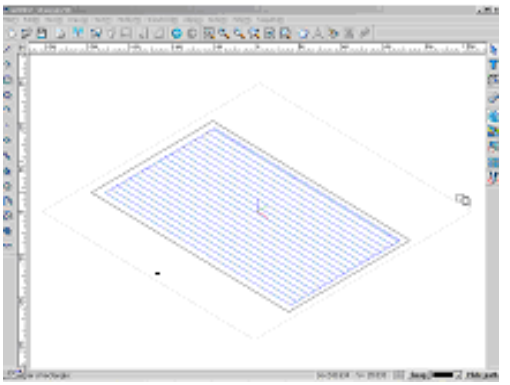


Fig 3-12a (Zoom window in 3D view)

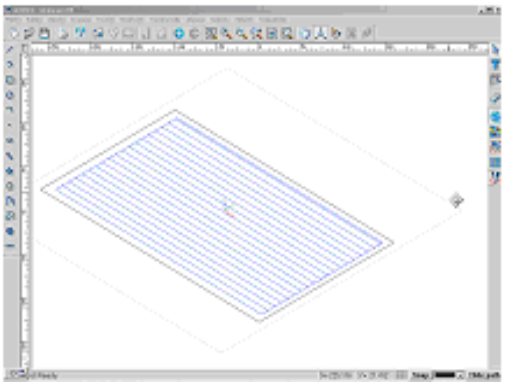


Fig. 3-12b (Zoom In 3D view)

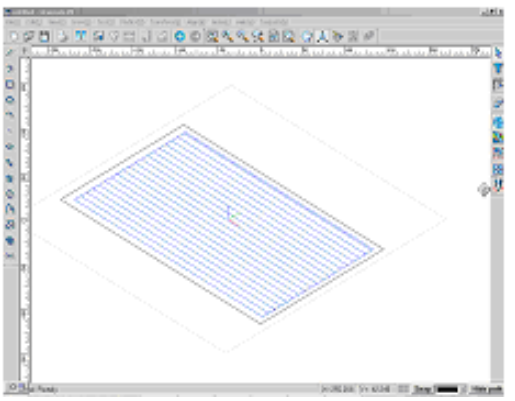


Fig. 3-12c (Zoom out in 3D view)

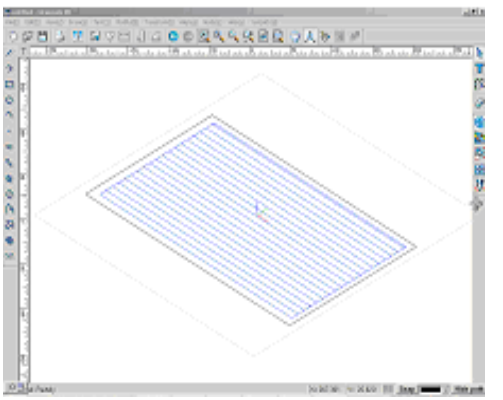


Fig. 3-12d (Fit to all in 3D view)

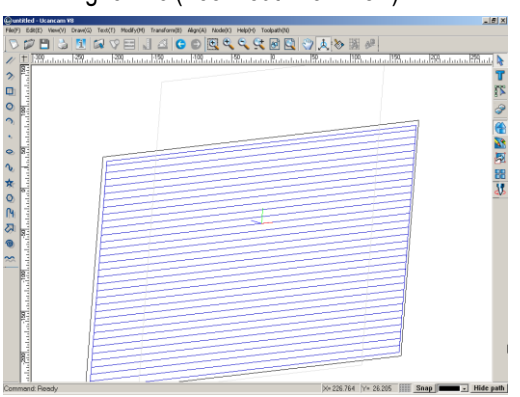


Fig. 3-12e (Fit to page in 3D view)

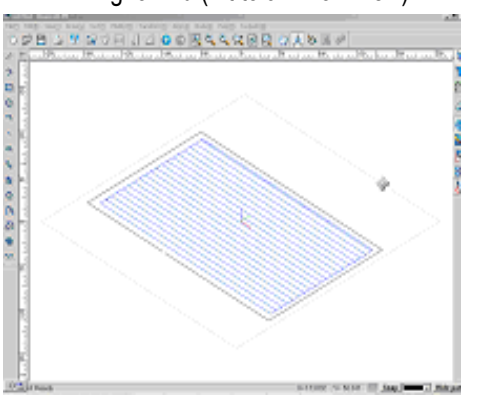


Fig. 3-12f (Pan View in 3D view)

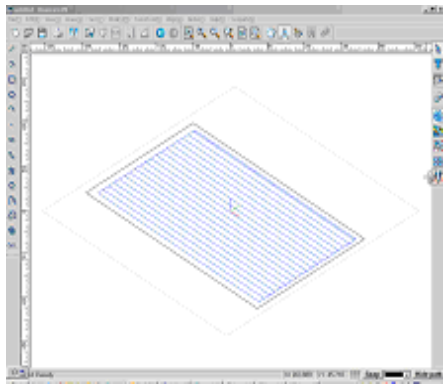


Fig. 3-12g (Dynamic zoom in 3D view)

REMARK: In the 3D view mode, press keyboard arrow keys to move the page up, down, right and left. Press X, Y, Z key to rotate the page along X, Y, Z axis respectively. During rotating, if **Shift** key is pressed, rotation direction is anti-clockwise.

3.2.9 Filled Display

Selected objects can be filled with color through **Filled display** function. Select **View->Filled display** to start the operation. (Fig.3-13)

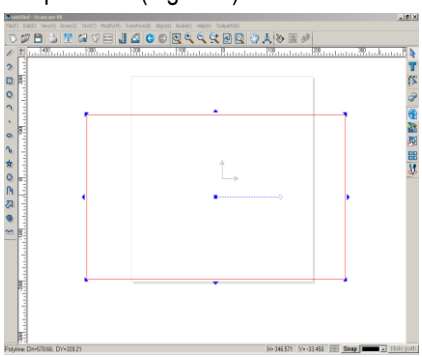


Fig. 3-13a (original)

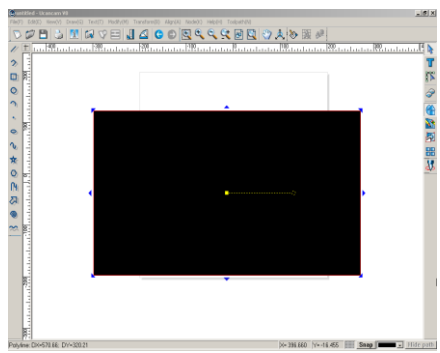


Fig. 3-13b (filled display)

REMARK: Click the color box in the status bar to display the color dialog. (Fig.3-25). Select a color to fill the object.

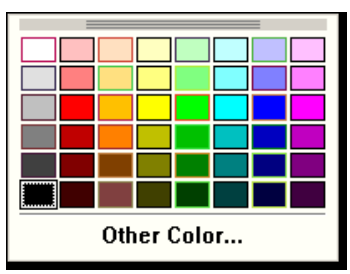


Fig. 3-13

3.3 Basic Settings

3.3.1 System Settings

System setting: is aimed at making the operations more customizable to each user.

Click **View->System Settings** on the menu bar, the **System Settings** dialog is shown. (Fig. 3-14)

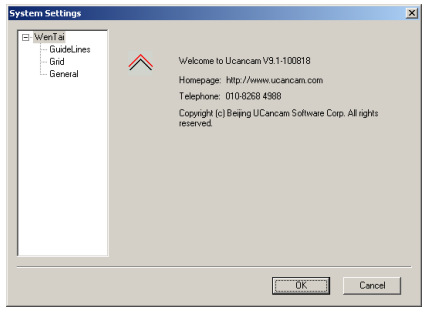


Fig. 3-14

Set up guidelines

Guidelines are vertical or horizontal lines that you can add anywhere in the drawing Window to help you measure, align, and position objects.

You can display or hide the guidelines. You can also add, delete, move, and lock guidelines in the drawing window. (Fig. 3-15)

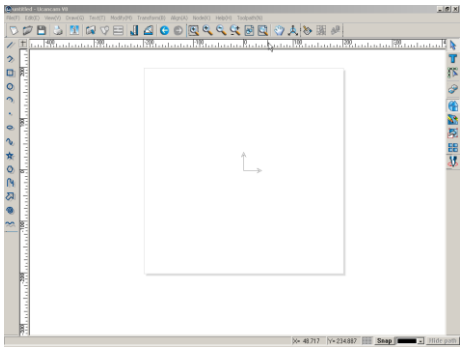


Fig.3-15a put the mouse on the ruler

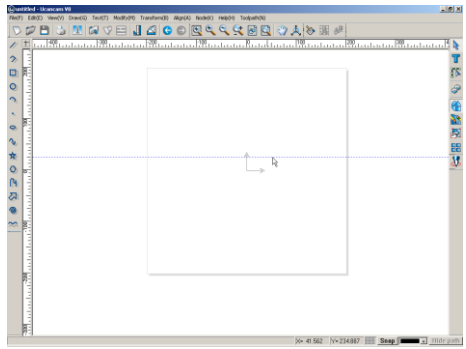


Fig. 3-15b guideline displays

After putting the cursor on the ruler, press and hold the left mouse and then drag the guide line to the desired position. (Fig. 3-16) You can drag several guidelines by following the above steps.

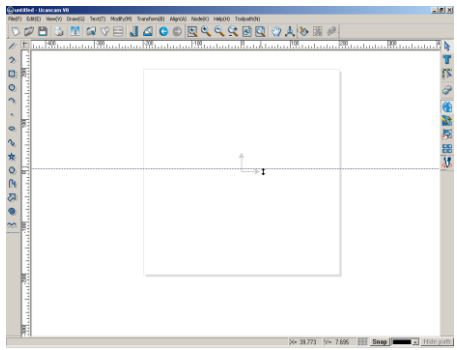


Fig. 3-16

It is very difficult to drag the guideline to a specific position with the method above, so guideline setting function is provided by Ucancam.

This function can be started by clicking **View->System Settings** on the menu bar. Click on **Guidelines**. (Fig.3-17)

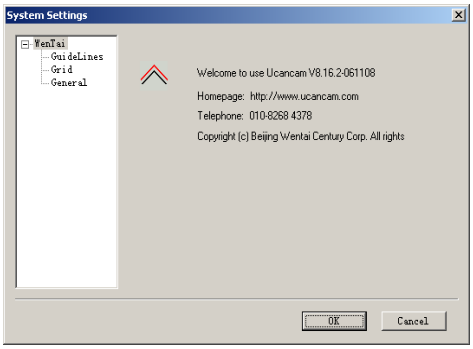


Fig. 3-17

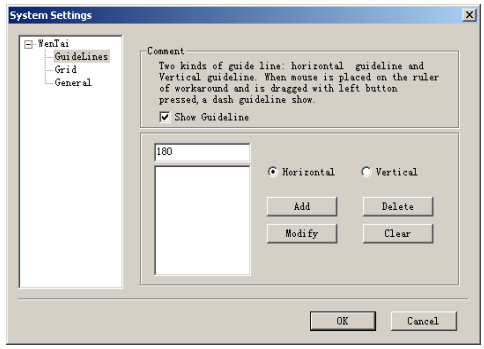


Fig. 3-18

First enter the value of the guideline coordinate, e.g.180, in the dialog. (Fig. 3-18)

Then, select **Horizontal** or **Vertical** before clicking on Add. Then a guideline is added in the working window. (Fig. 3-19)

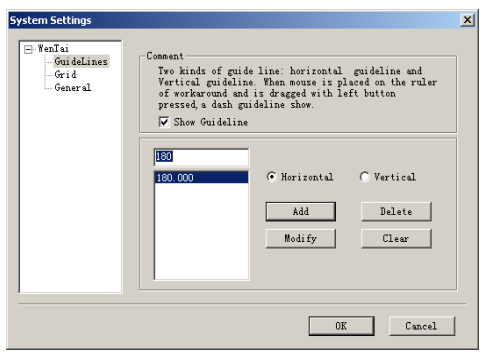


Fig. 3-19

You can add more guidelines by repeating the steps above. (Fig.3-20). Click OK, and the added guidelines are shown in the drawing window.

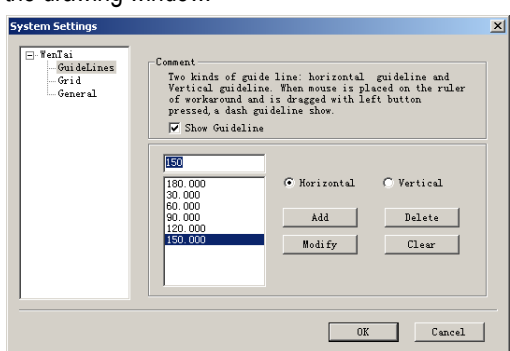


Fig. 3-20

Guidelines can also be deleted, modified or hidden.

There are three ways to delete guidelines.

- Click on the guideline and press the **Delete** key on the keyboard.
- Put the cursor on the guideline, and when the cursor changes into ↕ or ↔, drag the guide line back onto the ruler.
- Select the value of the guideline in **Guidelines** tool bar, the value is covered in blue (see Fig.3-20) and then click on Delete.

If you want to delete all horizontal and vertical guidelines, select the guidelines in **Guidelines** tool bar and click on Clear.

To modify a guideline, that is to change the position of a guideline, first select the value in the **Guidelines**, and click on Modify. Then input a new value, and the guideline position is changed.

The guidelines not used can be hidden by clicking **View->Guidelines show/hide** in the menu bar or by un-checking "√" before **Show Guidelines**.

Grids setting

Grids are a series of intersecting lines superimposed on an object to help you align and position objects accurately. You can display or hide grids at any time. You can have objects align automatically with the gridlines. You can set up the grid by specifying values for the frequency, which is the number of gridlines per unit of horizontal and vertical distance, or the spacing, which is the distance between the grid lines. The style of grids can also be changed.

For more precise pixel editing at maximum zoom level, you can display a grid around each pixel.

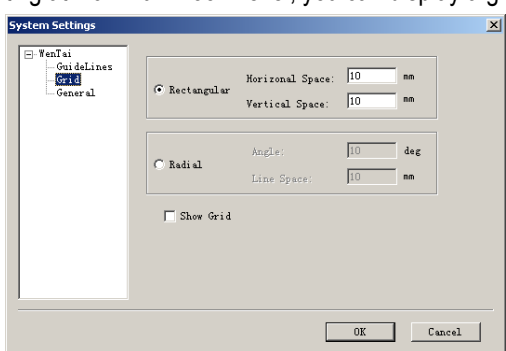


Fig. 3-21

There are two kinds of grids in Ucancam: rectangular (Fig. 3-22) and radial (Fig. 3-23). The space of the rectangular grids can be adjusted by setting the horizontal and vertical spaces, and spaces of the radial grids can be adjusted by setting the angle and space between every two lines.

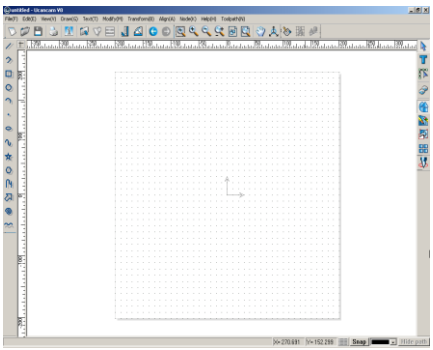


Fig. 3-22 Rectangular grids

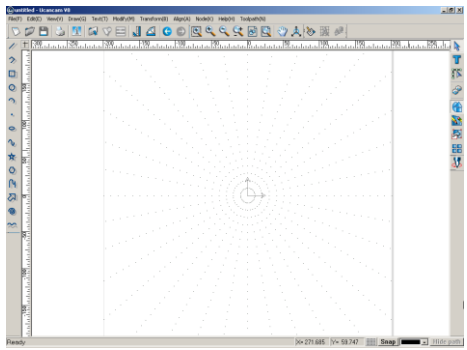


Fig.3-23 Radial grids

The background grids can be changed by any of the following two ways.

- Add or un-checking the "√"before **Show Grids**;
- Click **View->Grids**; or click on the icon on **Status bar**.

General settings

General settings include **Auto Save, Curve Accuracy,** and **Maximum Angle of Centerline.**

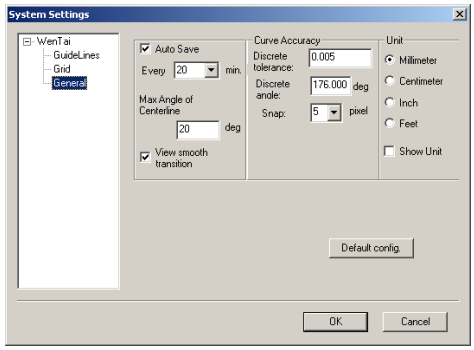


Fig. 3-24

- **Auto Save**

Auto save ensures that no data will be lost accidentally. Objects are saved in a file named **backup.ucc** and the file is in Ucancam Install directory. You can set the auto save intervals by typing in a value in **Auto Save**.

- **Curve Accuracy**

Show

Displayed curves are more accurate if smaller values are entered in **Show** tool bar, but the accuracy has no effect on tool path.

Machining

If value of machining accuracy is smaller, tool paths calculated and the machining result are better.

Snap

Users can set the mouse snap accuracy. If the distance between the cursor and a point is less than the snap accuracy after snap function starts, the cursor changes into and the point is snapped.

- **Maximum Angle of Centerline**

Maximum angle of centerline is the angle formed by any two adjacent centerlines. The centerlines

can be formed only when the angle exceeds the defined value. This setting is useful when processing midlines.

As can be seen in Fig. 3-25, when the defined angle is 30 degrees, the centerline with an angle of 45 degrees is shown as below (Fig. 3-26). But if the pre-defined angle is above 45 degrees, then the effect is not shown.

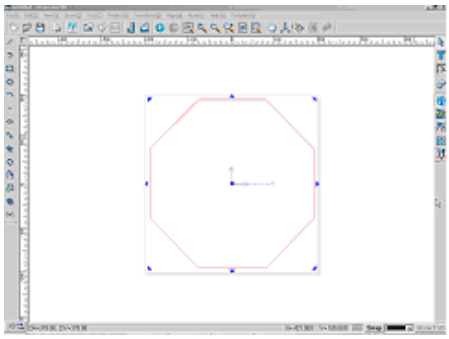


Fig 3-25

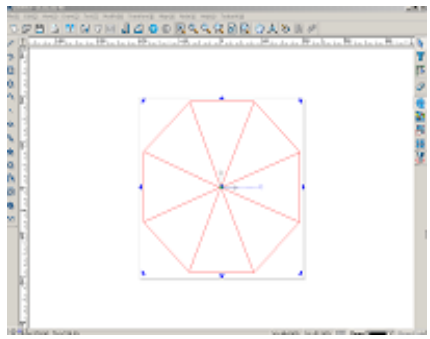


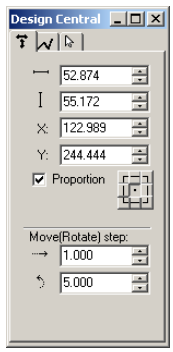
Fig. 3-26

- **View smooth transition**

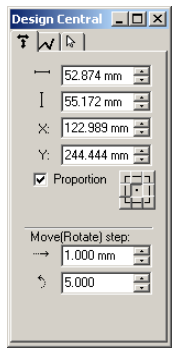
If check the “View smooth transition”, when change viewing ,like as zoom window, zoom in zoom out, pan view, fit to all etc ,ucancam would swtich view by animation.

- **Show Unit**

If check the “Show Unit”, all the numeric edit box in all dialog would show the unit, like as “mm”, “inch” etc.



don’t Show Unit



Show Unit ”mm”

Default settings

The default parameters can be set by clicking on Default config..

REMARK: It is recommended not to change the parameters unless there are special requirements.

3.3.2 Snap Function

Snap function is very helpful when we need to find perpendiculars, tangents, center lines, etc. We use the snap function to find the end points, adjacent points, middle point, center of a circle, intersection points, perpendicular points, tangent points, quartiles and grids.

The following dialog is displayed after selecting **View->Snap Settings** command or clicking on

Snap in the right corner of the status bar. (Fig. 3-27) Click Snap again, the dialog is hidden automatically.

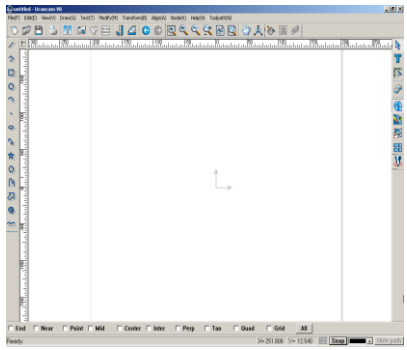


Fig. 3-27

The feature points must be picked up first, otherwise the snap function will not work. Next we are going to see two examples to introduce the snap function.

Example

Now we want to draw a line with the rectangle's one side's midpoint as an end point of the line. The following is an example.

1 First draw a rectangle.

2 Then click on Snap in the lower right corner of the screen. The feature point tool bar is displayed in the bottom of the screen. (See below.)

3 Tick the **Mid**.

4 Put one end of the line outside the rectangle, and drag the mouse onto the side of the rectangle. When the cursor changes into "⚓", the midpoint of one side of the rectangle is found. (Fig. 3-28)

5 Click the left mouse button, and the end point of the line is fixed in the mid point of the rectangle's side.

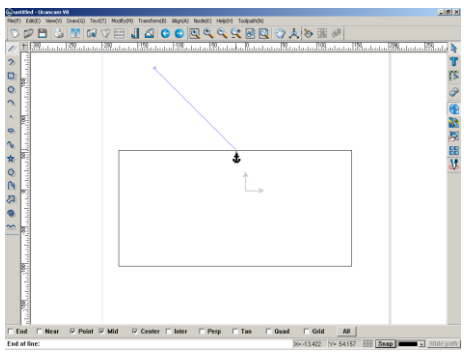


Fig. 3-28

REMARK: The above points are not necessarily fit for all curves. For example, tangency points are applied to curves like arcs and splines, but not to rectangles; perpendicular is applied to line and rectangle but not to circle.

3.4 Other Tools

3.4.1 Show/Hide

This function is to avoid the influences of intersected or adjacent objects when drawing or editing an object.

1. Select an object.
2. Select **Edit->Hide object** on the menu bar.

Then the selected object is hidden. (Fig. 3-29b)

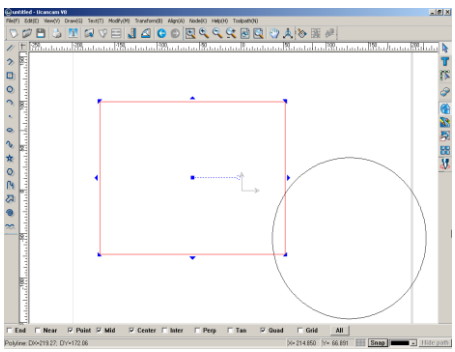


Fig. 3-29a

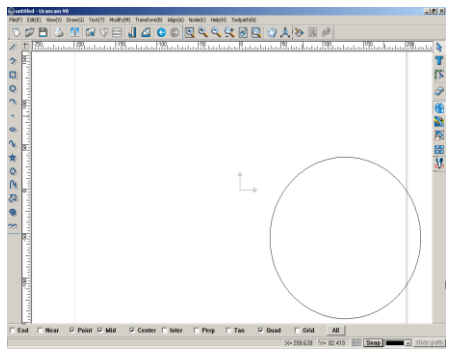


Fig. 3-29b

The hidden object reappears after clicking **Edit->Show object**. (Fig. 3-30)

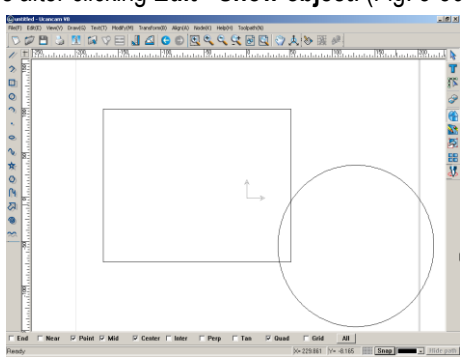


Fig. 3-30

REMARK: This function is very useful when calculating tool paths. (Please refer to **Tool Path** in Chapter Ten.)

3.4.2 Lock/Unlock

When **Lock** function is enabled, an object's position, shape and size are preserved.

To lock an object

1 Select the object to be locked.

2 Click **Edit->Lock/unlock** on the menu bar. (Fig. 3-31)

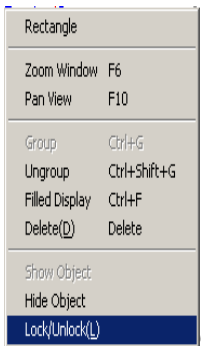


Fig. 3-31a (click on lock/unlock)

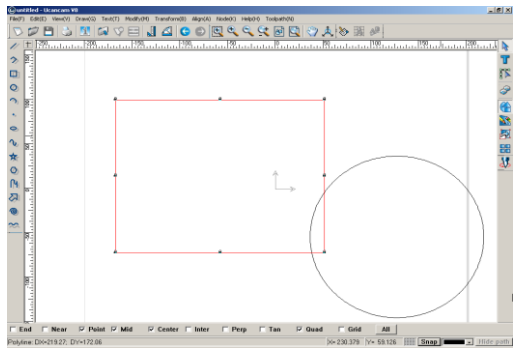


Fig. 3-31b (the rectangle is locked)

To unlock an object

1 Select the object.

2 Click **Edit->Lock/unlock** on the menu bar.

3.4.3 Redraw

You can improve the appearance of an object by removing unwanted speckles on it. You can enable this function by clicking **View->Redraw** on the menu bar or by pressing **F5** on the keyboard.

3.4.4 Measuring Tools

Such functions as Distance measure, Angle measure, Perimeter measure, Area measure are available in Ucancam.

Distance measure

1 Click on the icon on **Standard Bar**, or click **Help->Distance measure** on the menu bar.

2 The cursor changes into .

3 Pick the starting point and end point with the mouse.

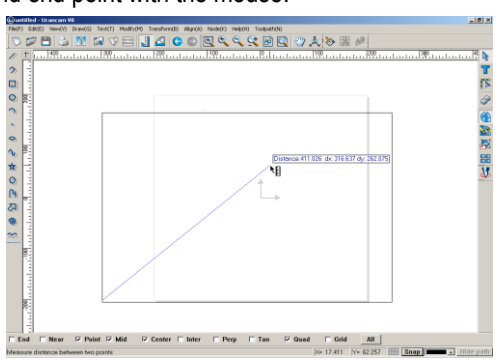


Fig.3-32

REMARK: In case of measuring horizontal or vertical distances, press **Shift** key on the keyboard, and drag the mouse to move on horizontal or vertical direction.

Angle measure

1 Click the icon on **Standard Bar**, or click **Help->Angle measure** on the menu bar.

2 When the cursor changes into , click on the angle peak and then move the cursor along one side of the angle. Click again.

3 Continue to move the cursor until the cursor reaches the other side of the angle. Click the left mouse button again.

4 Then angle degree is shown. (Fig. 3-33)

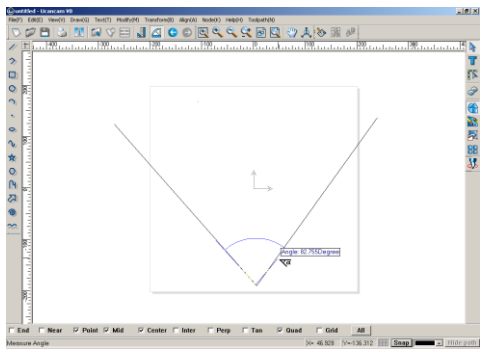


Fig. 3-33

Perimeter measure

1 Click **Help->Perimeter measure** on the menu bar.

2 The cursor changes into .

3 Move onto the shape to be measured. (Fig. 3-34)

4 When the shape outline changes into dotted blue lines, click the left mouse button.

The value of the perimeter of the shape is shown in the status bar in the lower left corner of the screen.

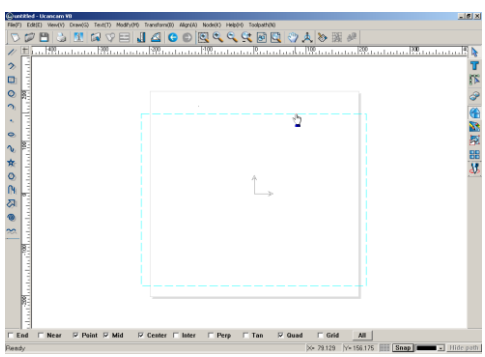


Fig. 3-34

Area measure

Area measure is for measuring the size of a shape.

1 Click **Help->Area measure** in the menu bar.

2 The cursor changes into .

3 Move onto the shape to be measured.

4 When the shape is changed into a dotted blue line, click the left mouse button. (Fig. 3-35)

5 The value of the size of the shape is shown in the status bar in the lower left corner of the status bar.

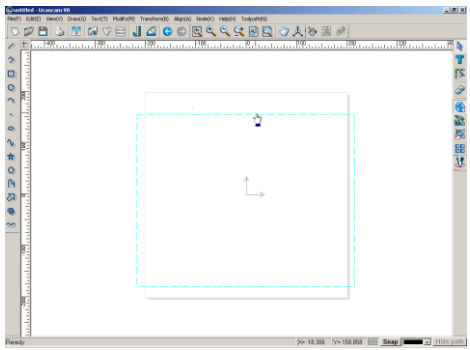


Fig. 3-35

The Maximum Inscribed Circle

1 Click **Help-> The maximum inscribed circle** on the menu bar, or press “Alt +5” on the keypad.

2 The cursor changes to .

3 Move the cursor to the graph to be measured, and the graph is changed into a dotted blue line.

4 Press the mouse left button.

5 The measured value is displayed in the status bar.

3.4.5 Calculator Notepad & Microsoft Paint

Calculator, Notepad and Microsoft paint are available in Ucancam to make your operation easier.

Calculator

Calculator can be enabled after clicking **Help->Calculator** on the menu bar. (Fig. 3-36)

Notepad

Notepad can be enabled after clicking **Help->Notepad**. (Fig. 3-37)

Microsoft paint

Microsoft paint can be enabled after clicking **Help->Microsoft paint** on the menu bar. (Fig.3-38)

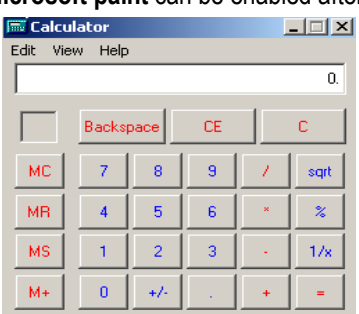


Fig. 3-366

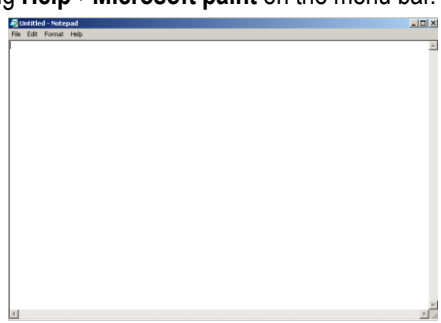


Fig. 3-37

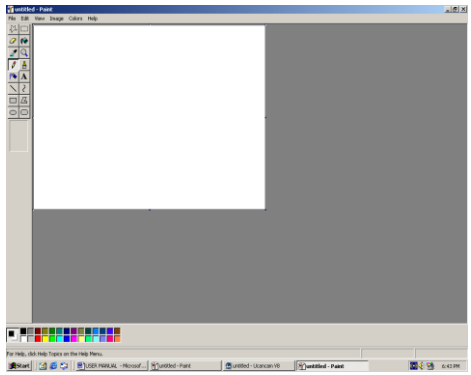


Fig. 3-38

3.4.6 Help

Ucancam offers a variety of ways to help you learn the application.

- User manual
- On line technical support
- Help available in the Ucancam

To use **Help**

1 Click **Help**->**Help** in the menu bar.

2 The **Help** dialog displays. (Fig. 3-39)

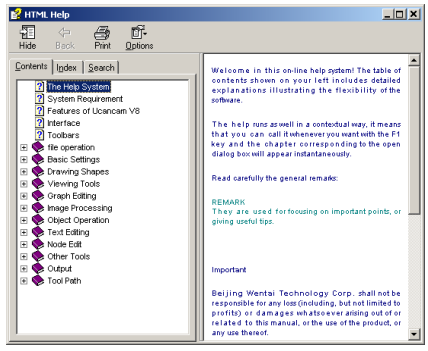

HTML Help
Hide
Back
Print
Options
Contents
Index
Search
The Help System
System Requirement
Features of Ucancam V8
Interface
Toolbars
file operation
Basic Settings
Drawing Shapes
Viewing Tools
Graph Editing
Image Processing
Object Operation
Text Editing
Node Edit
Other Tools
Output
Tool Path
Welcome in this on-line help system! The table of contents shown on your left includes detailed explanations illustrating the flexibility of the software.
The help runs as well in a contextual way, it means that you can call it whenever you want with the F1 key and the chapter corresponding to the open dialog box will appear instantaneously.
Read carefully the general remarks:
REMARK
They are used for focusing on important points, or giving useful tips.
Important
Beijing Wentai Technology Corp. shall not be responsible for any loss (including, but not limited to profits) or damages whatsoever arising out of or related to this manual, or the use of the product, or any use thereof.

Fig. 3-39

3.4.7 Tip of The Day

Tip of The Day includes basic functions and operation methods

Open software, the dialog of Tip of the Day is shown automatically, (Fig 3-40) this dialog will not be shown automatically by un-checking"√" before **Show tips at start** .click **Help**->**Tip of the day** on menu bar. Press **Next Tip** you will get more information

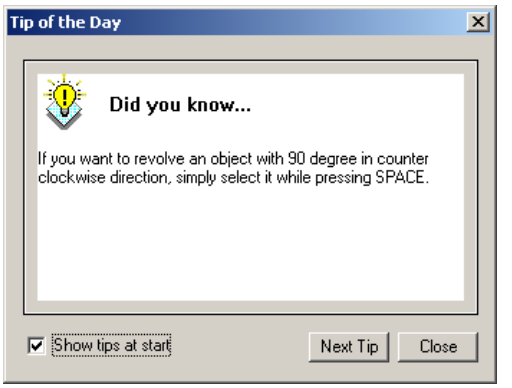

Tip of the Day
Did you know...
If you want to revolve an object with 90 degree in counter clockwise direction, simply select it while pressing SPACE.
Show tips at start
Next Tip
Close

Fig 3-40

3.4.8 About Ucancam

The information about Ucancam is available for users to know more about Ucancam.

1 Click **Help**->**About Ucancam** on the menu bar.

2 The dialog **About Ucancam** is displayed. (Fig. 3-41)

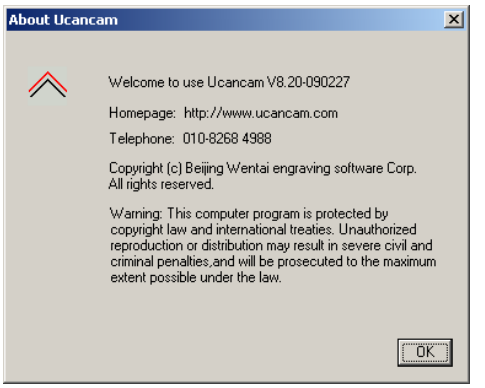

About Ucancam
Welcome to use Ucancam V8.20-090227
Homepage: http://www.ucancam.com
Telephone: 010-8268 4988
Copyright (c) Beijing Wentai engraving software Corp. All rights reserved.
Warning: This computer program is protected by copyright law and international treaties. Unauthorized reproduction or distribution may result in severe civil and criminal penalties,and will be prosecuted to the maximum extent possible under the law.
OK

Fig 3-41

The dialog is closed by clicking

or pressing the **Enter** key on the keyboard.

4. DRAWING SHAPES

Line, arc, circle, ellipse, Bezier curve, wavy line, combine curve, points, rectangle, star, spiral and regular polygons can be created and drawn in Ucancam.

The following are the main features in Ucancam.

- Point coordinates can be numerically input.
- Automatically snap end points, midpoints, intersection points, tangency points, and other feature points.
- Editing functions such as delete, offset, cut and trim, and Boolean operation functions such as join, common, not common and subtract are available.
- Transformation tools like move, rotate, mirror, scale and aligning tools such as horizontal spacing, and make the same size are available.
- Useful node editing tools.

This chapter is devoted to a general introduction of creating and drawing geometrical shapes and using the symbol library. Objects with various shapes can be created after reading this chapter.

4.1 Create Simple Shapes

You can create simple shapes by entering coordinates on status bar. The origin (0, 0) is in the center of the page.

Absolute coordinate: is to fix a relative point of origin at a certain position by entering two values of X and Y axis coordinates on status bar. Eg coordinate “100,200”, 100 is the values of X axis coordinate, 200 is the values of Y axis coordinate.

Relative coordinate: is to fix a relative point at a certain position by entering two values of X and Y axis coordinates on status bar, with another point as the origin. Eg Enter “r100, 200” on status bar, 100 is the values of X axis coordinate, 200 is the values of Y axis coordinate.

Absolute polar coordinate: is to fix a point at a certain position by entering values of distance and angle on status bar. The values of distance represent the distance from the new point to origin. The values of angle is the angle made by rotating x-axis to the new point along x-axis forward direction， rotation direction is anti-clockwise. Eg Enter “100<30” on status bar, 100 is the values of distance, 30 is the values of angle.

Relative polar coordinate: is to fix a point at a certain position by entering values of distance and angle on status bar, with another point as the origin. The value of distance is the distance from the new point to another point. The angle made by rotating x-axis to the new point along x-axis forward direction, rotation direction is anti-clockwise Eg: Enter “r100<30” on status bar. 100 is the values of distance, 30 is the values of angle.

Expression: the values above can be instead by expression. Eg you can use “50+50, 100+100” instead of “100,200”

4.1.1 Line

1. Line

a 2 points Line

Method 1

1 Click the shortcut icon on **Curve Bar**, or click **Draw ->Line->Line** in the menu bar**.**

2 The words **Start of line** are shown in the status bar in the lower left corner.

3 Input a point's coordinates value, e.g. 10, 10, and press **Enter** key.

4 Input a point's coordinates value after the screen displays **End of line** in the status bar.

5 Press the **Enter** key and a line is created.

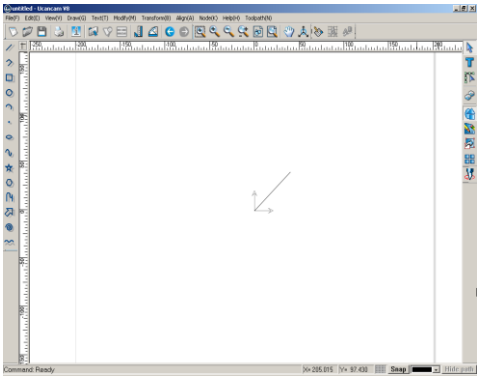


Fig. 4-1

Method 2

1 Click **Draw ->Line->Line** in the menu bar**.**

2 Click in the drawing window to pick the position of the starting point and end point of the line, and press right mouse button to finish operation.

You can reshape the line by transformation tools, such as moving, rotating, scaling etc. Detailed introduction to these transformations will be given in the following chapter

REMARK: Horizontal line and vertical line can be drawn by pressing the **Shift** key while moving the cursor. A coordinate (X, Y) represents a point position；"X" and "Y" are separated by a comma. In Ucancam, you will need to input coordinate value in many operation.

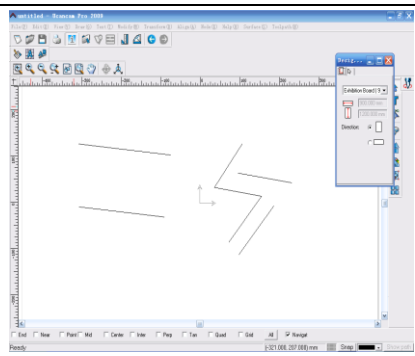
When you need to draw a precision curve, it is suggested to use method 1 to input point's coordinates.

b Parallel Line

1 Draw a line

2 Checking"√" before **Parallel Line** on status bar.

3 Click in the drawing window to pick the position as the starting point of parallel line, and then move cursor to select line, when selected line change into blue, move mouse to pick the end point of Parallel line.

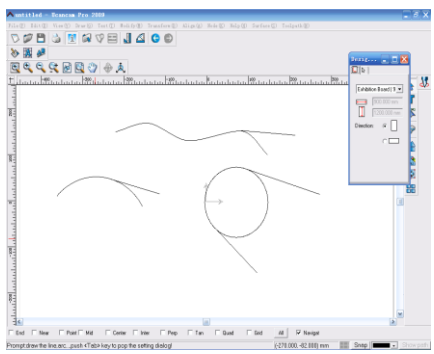


c Start, Curve, Tangent

1 Draw a circle, spline or circle.

2 Checking"√" before **Start, Curve, Tangent** on status bar.

3 Click in the drawing window to pick the position as the starting point of tangent, and then move cursor to select object, when selected shape change into blue, release left mouse button to finish operation.

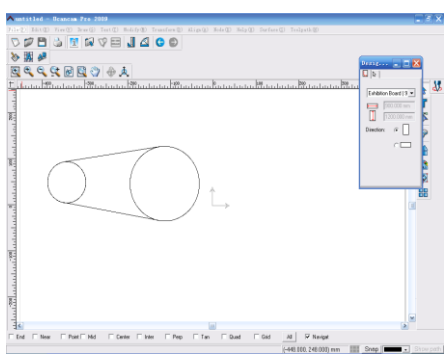


d 2 Curve Tangent

1 Draw two shapes such as two circles.

2 Checking"√" before **2 Curve Tangent** on status bar.

3 Select shape respectively, when selected shape became blue, release right mouse button to finish operation.



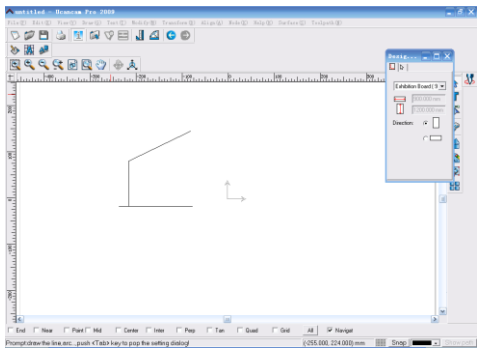
e 2 Curve Vertical

1 Draw two shapes such as two lines

2 Checking"√" before **2 Curve Vertical** on status bar.

3 Select shape respectively, when selected shape became blue, release right mouse button to finish

operation.



REMARK: Press **Ctrl** key on keyboard or click

by mouse to switch function on status bar.

2. Polyline

Method 1

1 Click the shortcut icon on **Curve Bar**, or click **Draw**->**Line**->**Polyline** in the menu bar.

2 Input polyline's points respectively according to prompt instructions in the status bar.

3 Click the right mouse button to finish this operation and a polyline is created.

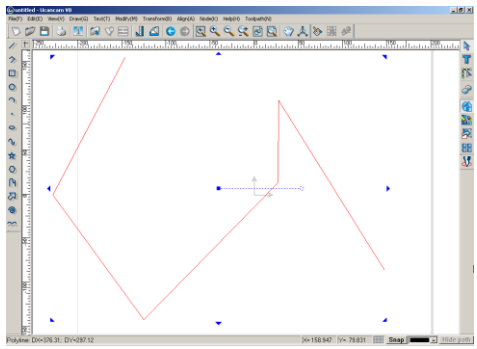


Fig. 4-2

Method 2

You can also just click in the drawing window to define the points of the polyline. You can end the operation by clicking the right mouse button.

REMARK:

Horizontal or Vertical polylines can be drawn by pressing the **Shift** key while moving the cursor.

Click menu **Undo(**Press the shortcut key **Ctrl + Z)**, remove the last point or curve segment drawn.

3. Double Polyline

You can draw two parallel lines at a time with **Double Polyline**.

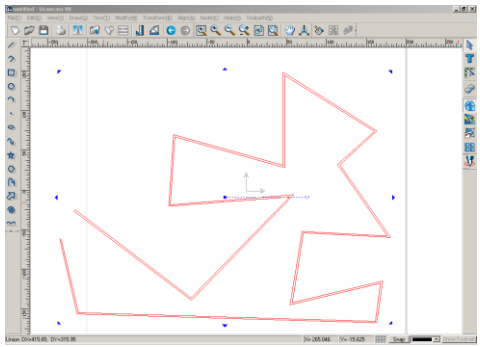


Fig. 4-3

4.1.2 Arc

1. Three-points

Method 1

1 Click the shortcut icon on **Curve Bar**, or click **Draw->Arc-> 3 Points** on the menu bar.

2 Input three points coordinates respectively in the status bar and press **Enter**.

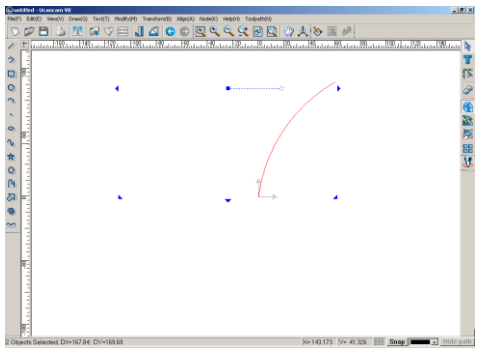


Fig. 4-4

Method 2

1 Click **Draw->Arc-> 3 Points** on the menu bar.

2 Click in the drawing window to fix the position of the three points of the arc.

2. Center, start, end

1 Click **Draw->Arc->Center, start, end** in the menu bar.

2 Input the coordinate in the status bar and press **Enter**.

REMARK: **Center** means the center of the circle the arc is on.

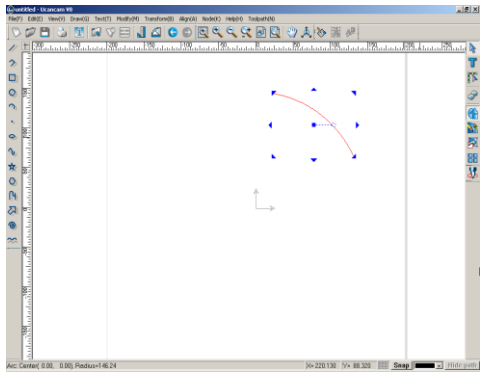


Fig. 4-5

Drawing an arc by **Center, start, end** command is the same as drawing a 3-point arc, and the only difference is that the starting point is different. In **Center, start, end**, the first point is the center of the circle, the second point is the starting point of the arc, and the third point is the end point of the arc.

3 Start, end, direction

When applying this method while drawing an arc, the first point is the starting point of the arc, the second point is the end point, and direction is the end point tangent.

4 Start, end, radius

The first point is the starting point of the arc, the second point is the end point of the arc and the third step is to define the radius of the circle the arc is on.

After inputting the values in the status bar, press **Enter** key to validate the operation.

5 Tangential Arc

You can draw an arc by a tangent. Follow the steps below.

1 Draw a circle.

2 Click **Draw->Arc->Tangential Arc** in the menu bar.

3 The cursor becomes a pen. Drag the pen to the circle, and a blue line appears. (Fig. 4-6)

4 Choose the position you want to put the arc, and then click the mouse button.

5 Then drag the pen to a specific position according to the radius of the arc to be created. Then click again to fix the radius.

6 Move the pen to define the arc length, and then click the mouse button to finish.

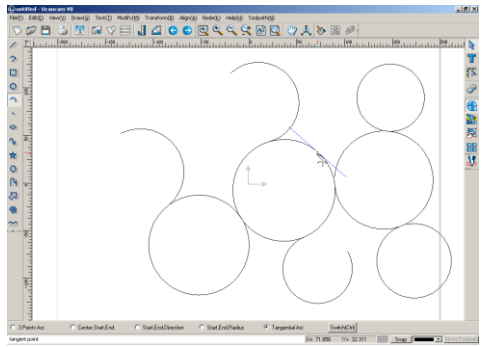


Fig. 4-6

4.1.3 Circle

Method 1

1 Click the shortcut icon in **Curve Bar**, or click **Draw**-> **Circle** on the menu bar.

2 The words **Center of circle** are displayed in the status bar.

3 Input a coordinate value, e.g.10, 10.

4 Press the **Enter** key, and the position of the center of the circle is fixed.

5 Input the value of the radius of the circle.

6 Press **Enter** key and a circle is drawn.

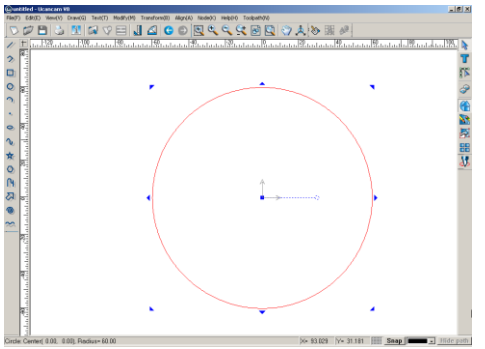


Fig. 4-7

Method 2

1 Click **Draw**-> **Circle** on the menu bar.

2 Click in the drawing window to pick a point as the center of the circle.

3 Move the mouse to define the radius of the circle.

4 Click the left mouse button to finish drawing the circle.

4.1.4 Ellipse

Method 1

1 Click the shortcut icon on **Curve Bar**.

2 Select **Draw**->**Ellipse** on the menu bar.

3 The words **Center of ellipse** are shown in the status bar.

4 Input a coordinate value to fix the position of the center of the ellipse.

5 Enter a coordinate value to define the end point of the first axis of the ellipse.

6 Enter the coordinate value of the length of the other axis of the ellipse.

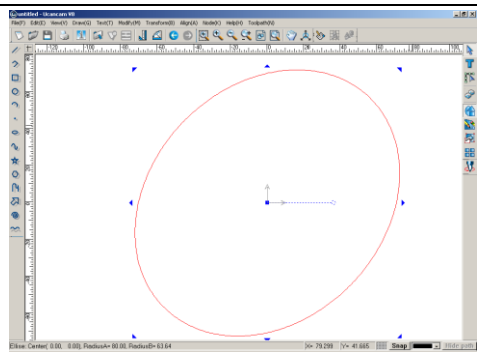


Fig. 4-8

Method 2

1 Select **Draw->Ellipse** on the menu bar.

2 Pick a point as the center of the ellipse by clicking in the drawing window.

3 Click in another position to fix one axis of the ellipse.

4 Click in a third point to define the radius of another axis of the ellipse

4.1.5 Spline

Method 1

1 Click the shortcut icon on **Curve Bar**, or click **Draw->Spline** on the menu bar.

2 Input coordinate value respectively by following the instructions in the status bar.

3 Finish the operation by clicking the right mouse button in the drawing window.

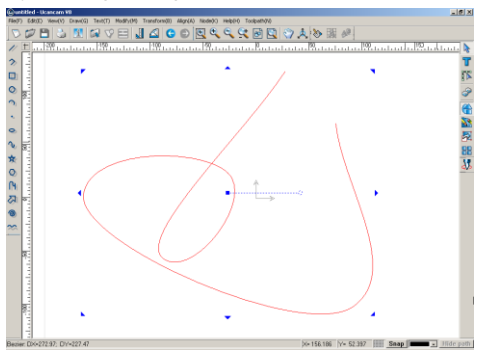


Fig. 4-9

Method 2

1 Click **Draw->Spline** on the menu bar.

2 Pick points respectively by clicking the left mouse button in the drawing window.

3 Finish the operation by clicking the right mouse button.

REMARK: Click menu **Undo(**Press the shortcut key **Ctrl + Z)**, remove the last point or curve segment drawn.

4.1.6 Combine Curve

Combine curve is consisted of lines, arcs and splines. You can switch between line, 3 Point Arc,

Tangential Arc and Spline drawings.

1 Click the shortcut icon on **Curve Bar**， or click **Draw->Combine curve** on the menu bar.

2 By default, the first shape is a line. You can switch between these shapes by clicking on options in the status bar. A combine curve example is shown in Fig. 4-11.

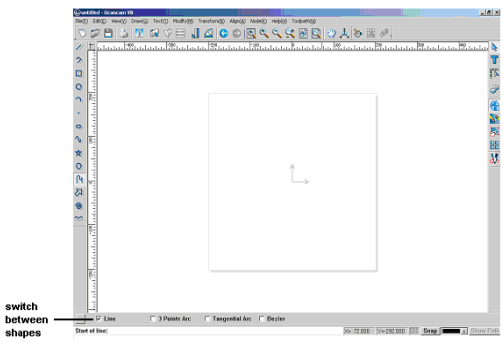


Fig 4-10

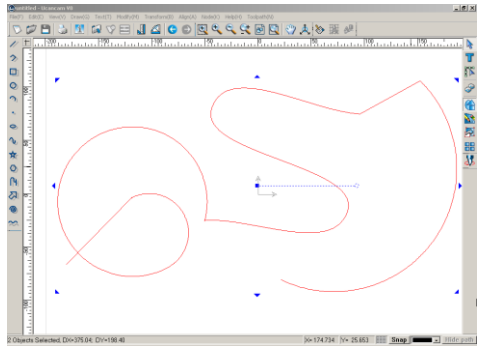


Fig. 4-11

REMARK: Click menu **Undo(**Press the shortcut key **Ctrl + Z)**, remove the last point or curve segment drawn.

4.1.7 Points

Method 1

Click the icon on **Curve Bar**, or click **Draw->Point** on the menu bar.

Several points can be drawn at a time by inputting the coordinates of the points by following instructions in the status bar.

Method 2

Click **Draw->Point** on the menu bar, or pick points by clicking in the drawing window.

4.1.8 Rectangles

1. Rectangle

Method 1

1 Click the shortcut icon on **Curve Bar**, or click **Draw->Rectangle->Rectangle** in the menu bar.

2 Input coordinate value by following instructions in the status bar.

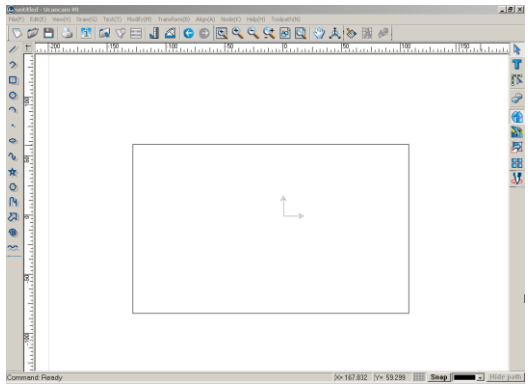


Fig. 4-12

Method 2

1 Click **Draw->Rectangle->Rectangle** in the menu bar.

2 Pick two points by clicking in the drawing window.

3 Finish this operation by clicking the right mouse button.

2. Fillet rectangle

There are two ways to draw a fillet rectangle:

Method 1

1. Click **Draw->Rectangle ->Fillet Rectangle** on the menu bar.

2. Input two corner points' coordinates and radius of fillet.

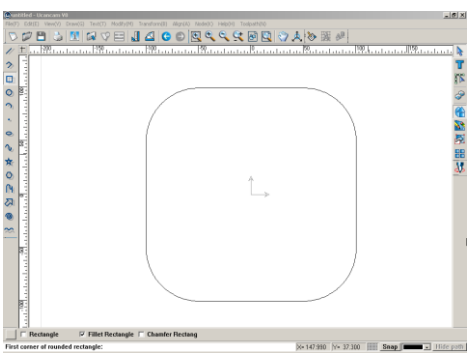


Fig. 4-13

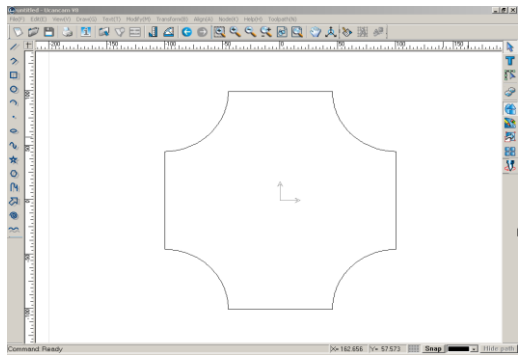


Fig. 4-14

Method 2

1 Click **Draw->Rectangle ->Fillet Rectangle** on the menu bar.

2 Pick two points as two of the rectangle' corners by clicking in the drawing window.

3 Get the correct radius by moving the mouse and clicking the left mouse button.

REMARK: When using Method 1 to create a Fillet rectangle, you can move the cursor to get two different results.

3. Chamfer rectangle

Method 1

1 Click **Draw->Rectangle->Chamfer rectangle** in the menu bar.

2 Input points' coordinates and chamfer value.

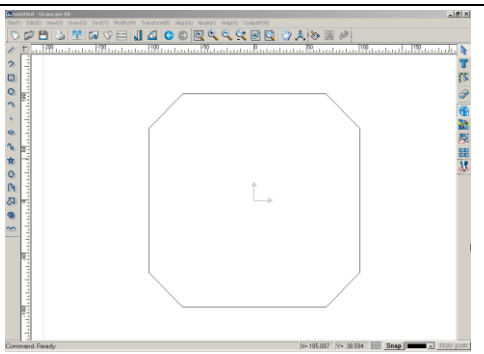


Fig. 4-15

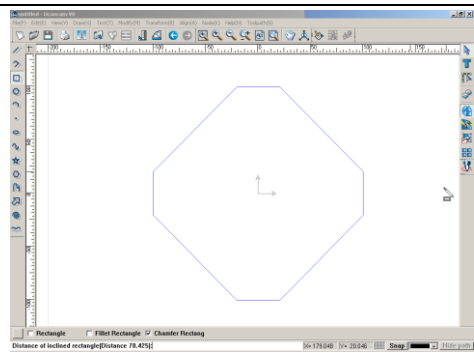


Fig. 4-16

Method 2

1 Click Draw->Rectangle->Chamfer rectangle in the menu bar.

2 Pick two points as a rectangle's corners by clicking in the drawing window.

3 Get a chamfer distance by clicking in the drawing window.

The result is shown in Fig. 4-15. When moving the mouse to extreme points, the result is shown in Fig. 4-16

4.1.9 Star

Method 1

1 Click the shortcut icon in **Curve Bar**, or click **Draw->Star** in the menu bar.

2 Input numbers of sides, center point coordinate, first radius and second radius of star respectively by following instructions in the status bar.

Method 2

1 Click **Draw->Star** in the menu bar.

2 Input numbers of sides in the status bar.

3 Pick the center, first radius and second radius of the star by clicking in the drawing window.

The larger radius between first radius and second radius is regarded as star's outer radius. You can select one radius as star's outer or inner radius according to your need.

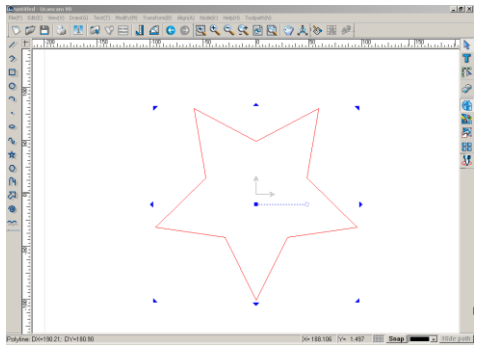


Fig. 4-17

REMARK: The Ratio of inner radius to outer radius of a standard star is 1:2.

4.1.10 Regular Polygon

Method 1

1 Click the shortcut icon on **Curve Bar**, or click **Draw->Regular polygon** in the menu bar.

2 Input the number of sides, the center point and radius respectively by following instructions in the status bar.

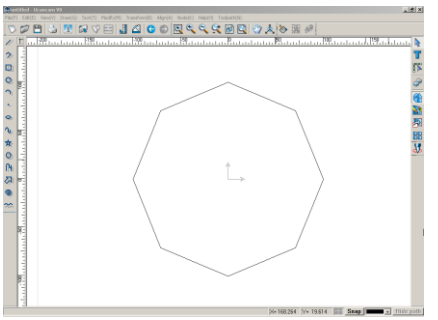


Fig. 4-18

Method 2

1 Click **Draw->Regular polygon** in the menu.

2 Input the number of sides in the status bar.

3 Pick the center point of the regular polygon and radius of polygon by clicking in the drawing window.

4.1.11 Arrow

The shape of an arrow is determined by four feature points. (Fig.4-19)

There are two ways to draw an arrow.

Method 1

1 Click the shortcut icon on **Curve Bar**, or click **Draw->Arrow** in the menu bar.

2 Input four feature points' coordinates respectively by following instructions in the status bar.

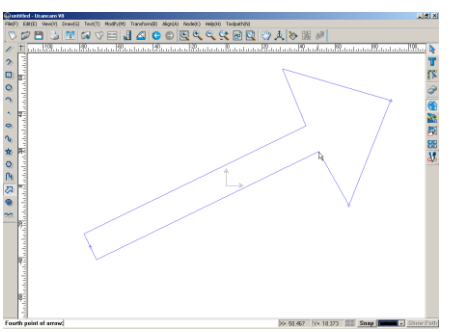


Fig. 4-19

Method 2

1. Click **Draw->Arrow** in the menu bar.
2. Pick four points by clicking in the drawing window.
3. Finish the operation by clicking the right mouse button.

4.1.12 Spiral

You can draw two types of spirals in Ucancam: **Archimedes spiral** and **Logarithm spiral**. The distance between every two windings of Archimedes spiral is the same. The distance between every two windings of logarithm spiral increases as the number of windings increases.

1. Click the shortcut icon on **Curve Bar**, or click **Draw->Spiral** in the menu bar.

2. The **Spiral Parameters** dialog (Fig. 4-20) is displayed.

Archimedes spiral

Fig. 4-20

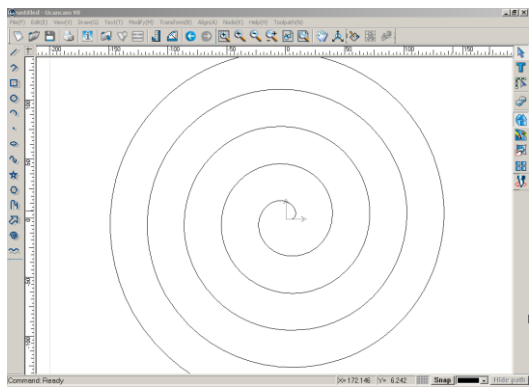


Fig. 4-21

Logarithm spiral

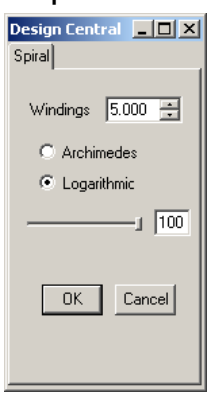


Fig. 4-22

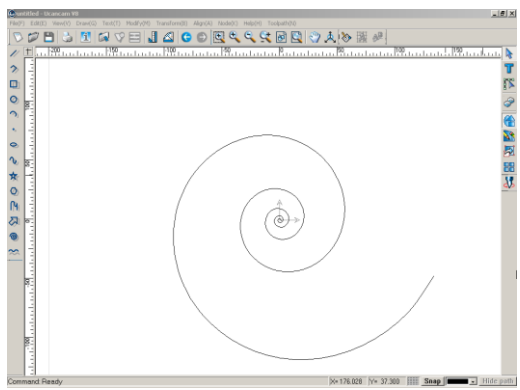


Fig. 4-23

When inputting data that is out of range, a warning message is displayed.

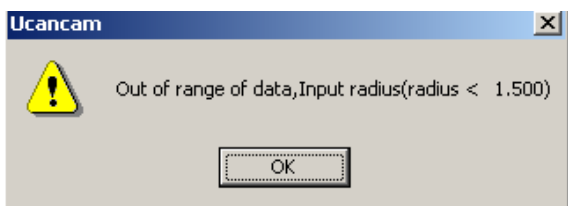


Fig. 4-24

4.1.13 Wavy line

Various types of wavy lines such as **Sinusoids, Swing Curves, Wavy Lines, Trapezium Polylines,** and **Wave Polylines** are provided in Ucancam.

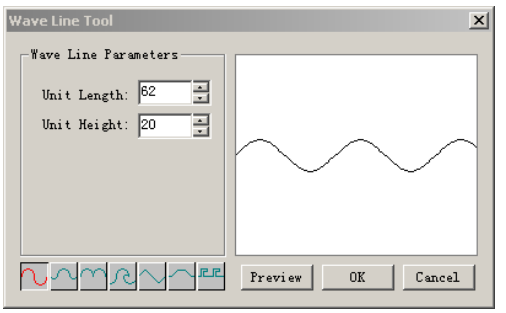


Fig. 4-25a

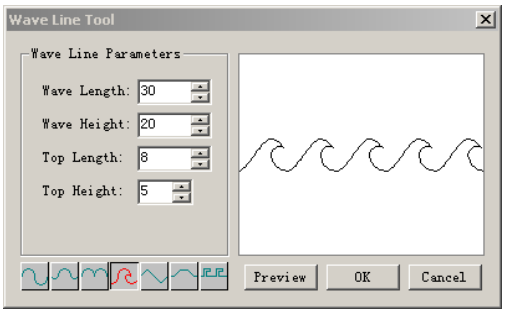


Fig. 4-25b

Wavy line parameters：

Unit length: is the length of each wave

Unit height: is the vertical distance between the wave top and the wave bottom.

Top length: is the length of the wave top

Top height: is the height of the wave tip

1 Click the shortcut icon , or click **Draw->Wavy Line** in the menu bar.

2 The dialog (Fig. 4-25) is displayed.

3 Select one type of wavy line.

4 Set the parameters and click on OK.

5 Then a wavy line is drawn.

The length and height of the wavy line can be adjusted, and the shape of the wavy line can be previewed. (Fig. 4-26)

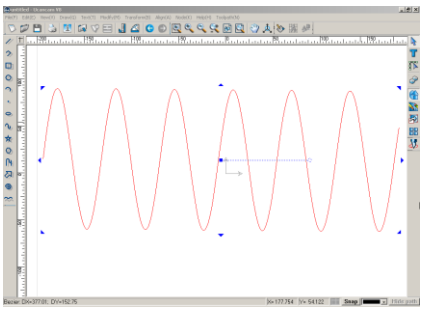


Fig. 4-26a

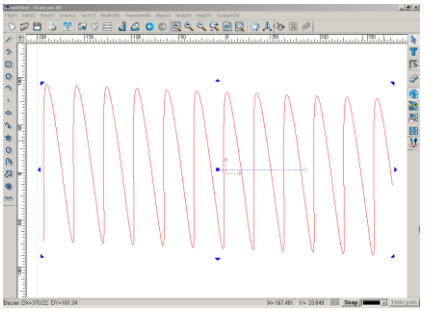


Fig. 4-26b

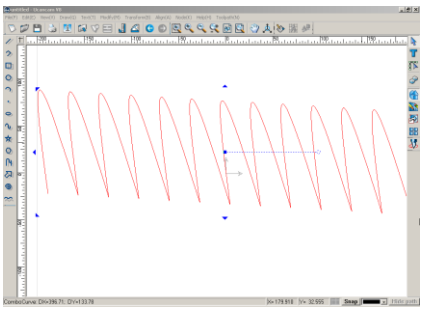


Fig. 4-26c

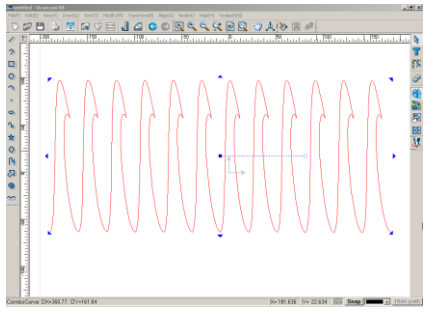


Fig. 4-26d

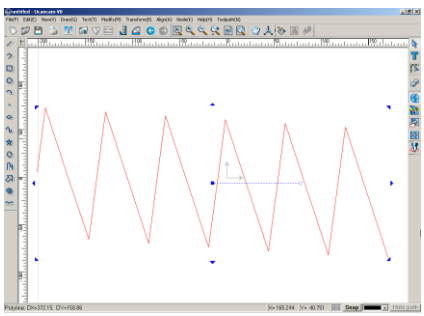


Fig. 4-26e

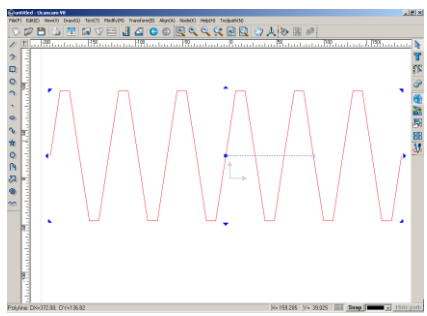


Fig. 4-26f

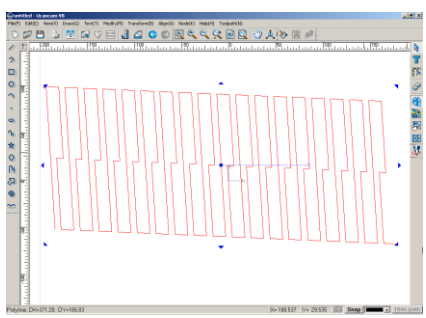


Fig. 4-26g

4.1.14 Hand Draw

Besides the shapes above, you can also use your imagination to create any freeform shapes by Hand Draw. Follow the steps below.

1 Click **Draw->Hand Draw** in the menu bar.

2 Click and hold the left mouse button to draw freeform shapes.

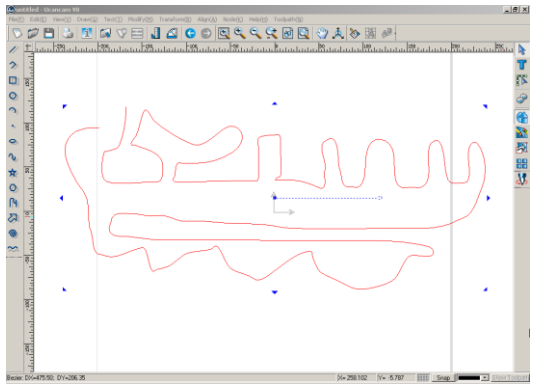


Fig. 4-27

4.1.15 Bounding Box

Adding a bounding box to an object is useful for machining. Sizes of a bounding box are changed by parameter settings according to your needs.

1 Select an object.

2 Click **Draw->Bounding box** in the menu bar.

3 The **Bounding Box** dialog is displayed. (Fig. 4-28)

4 Select appropriate values.

5 Click **OK** to finish the operation.

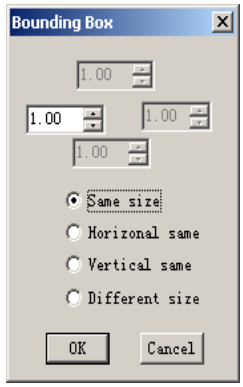


Fig. 4-28

Parameters

Same size: The modifications of the bounding box in four directions are the same.

Horizontal same: The modifications of the bounding box in the horizontal direction are the same.

Vertical same: The modifications of the bounding box in the vertical direction are the same.

Different size: The modifications of the bounding box in four directions are different.

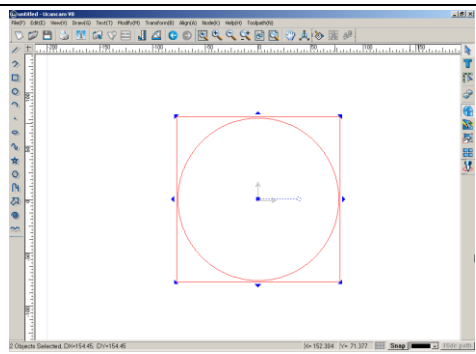


Fig. 4-29

4.2 Symbol Library

Numerous kinds of symbols are provided in Ucancam, including trade marks, auto brands, animals and plants, furniture, human figures, etc. (The total number of the symbols in the symbol library is about 10 thousand.)

4.2.1 Show/Hide Symbol Library

1. Click the icon on **Editing Bar**, or click **Draw->Symbol library** on the menu bar.
2. The **Symbol Library** dialog is displayed on the left of the drawing window. (Fig. 4-30)

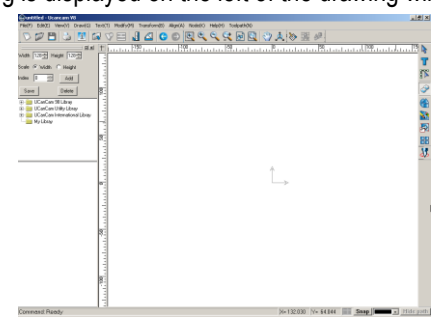


Fig. 4-30

To hide the **Symbol Library**, there are three ways

- Click icon on **Editing Bar**.
- Click **Draw->Symbol library**.
- Click on the button in the upper right corner of the dialog.

4.2.2 Contents In Symbol Library

Symbol Library is made up of four parts: **Ucancam 98 library, Ucancam Utility library**, **Ucancam International library**, and **My library**. Each of the four parts is further divided into smaller symbol libraries. Users can select the symbols from the Symbol library for use. (Fig. 4-31)

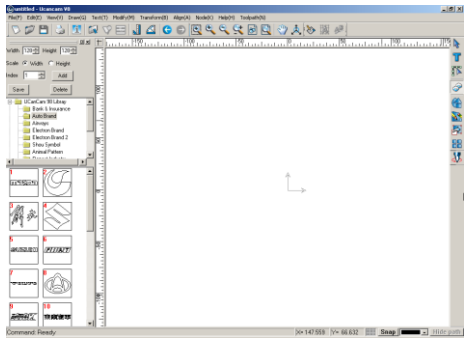


Fig. 4-31

4.2.3 Selecting A Symbol

You can browse the **Symbol library** and select a symbol which you need. All the symbols are divided into many groups according to their types.

There are two ways to insert a symbol into the drawing window: 1) click on the **Add** button in the dialog bar, 2) insert the symbol into the drawing window by clicking on the symbol and dragging it into the drawing window. The symbol's width, height and scale base are set by entering values in the **Width** and **Height** and **Scale** in the dialog.

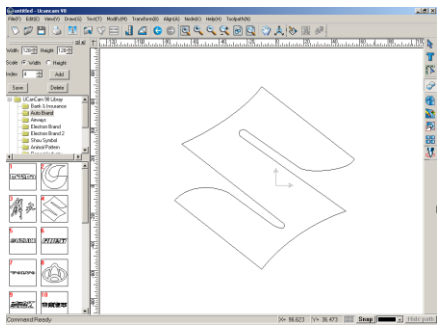


Fig. 4-32

REMARK: Because there are too many types of symbols in Symbol library, it is suggested to get familiarized with the symbols first so that it is easier to find the desired symbols in Symbol library.

4.2.4 My Library

Users can create their own symbols and save them to **My Library**.

1 Select an object.

2 Click on **Save** button on **Symbol library** dialog bar.

To delete a symbol from **My Library**

1 Click on the symbol to be deleted.

2 Click on **Delete** button in **Symbol library** dialog bar.

Other operations in **My library** are the same as the operations in the **Symbol library** before.

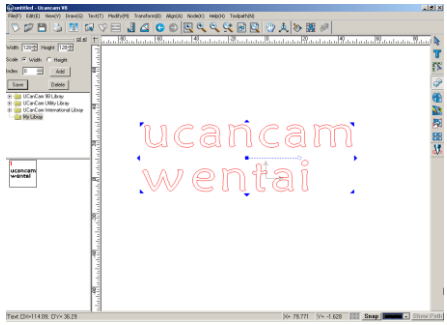


Fig. 4-33

REMARK: You can add or delete a symbol in **My Library**; symbols in other three symbol libraries can not be added or deleted by users.

5. OBJECT OPERATION

OBJECTS include points, lines, circles, polygons, texts, symbols, images and any other items in the drawing window.

5.1 Select An Object

5.1.1 Select With Mouse

There are three ways to select an object with mouse.

- **Select an object by clicking the left mouse button**

1 Move the cursor onto an object.

2 When the object is highlighted in dashed blue lines, click the left mouse button to select the object. The selected object is displayed in red.

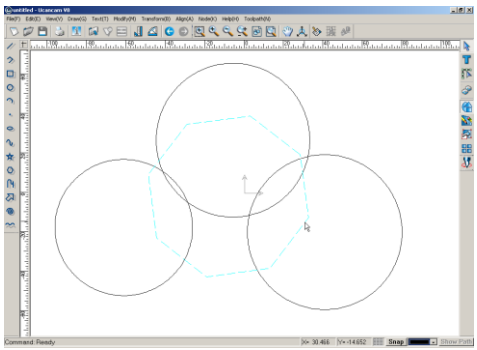


Fig. 5-1a (move the mouse onto the object)

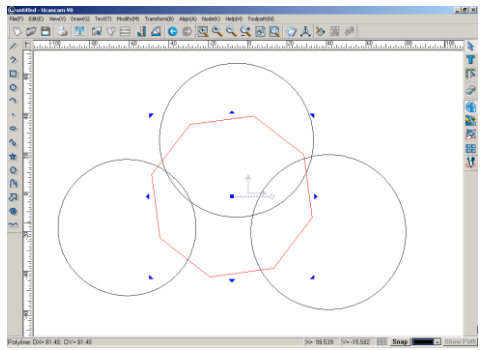


Fig. 5-1b (the object is selected)

REMARK: Hold down the **Shift** key, then click on each object you want to select, you can select multiple objects. (Fig. 5-2) To deselect an object, click on the object again. (Fig. 5-3)

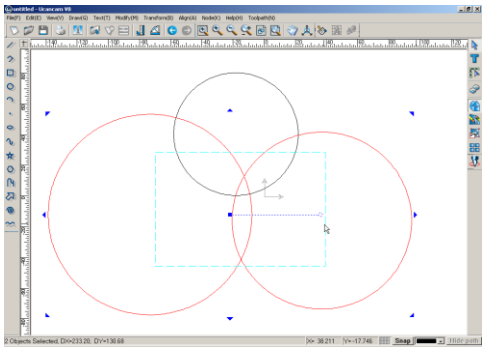


Fig. 5-2

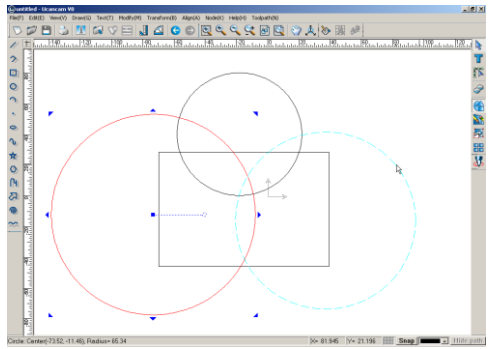


Fig. 5-3

- **Select objects with a line**

1 Press the **Ctrl** key.

2 Press and hold the left mouse button and move the mouse.

3 A blue dashed line displays in the drawing window. Objects which intersect with the line are highlighted in dashed blue lines.

4 Release the left mouse button to select objects. (Fig. 5-4)

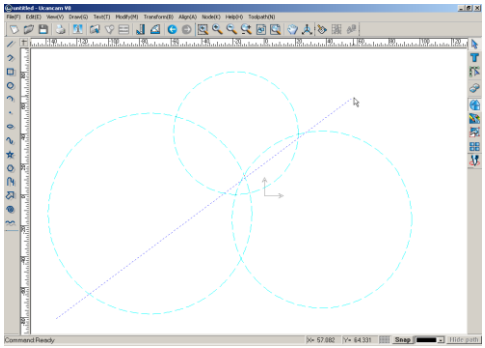


Fig. 5-4a objects are highlighted

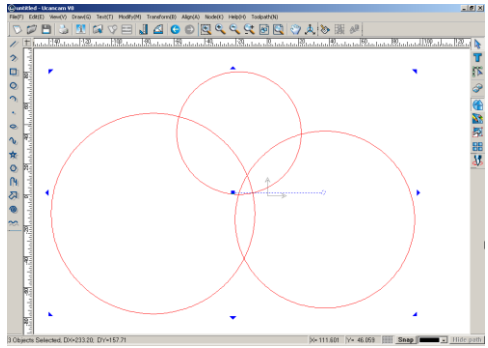


Fig. 5-4b the objects are selected

- **Select objects with a rectangle**

Method 1

1 Press the left mouse button and move the cursor from left to right. (Note: the moving direction is from left to right.)

2 Objects that are fully included in the blue rectangle are highlighted.

3 Release the left mouse button, and these objects are selected. (Fig. 5-5)

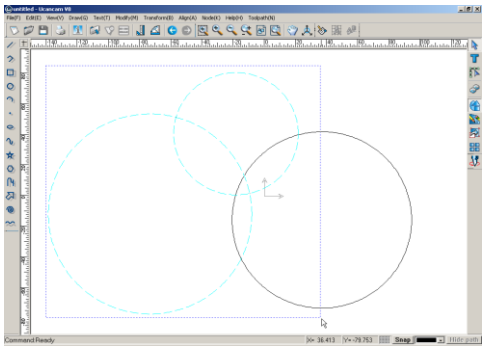


Fig. 5-5a A rectangle

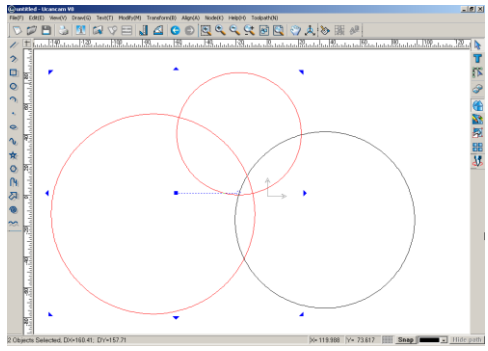


Fig. 5-5b the objects in the rectangle are selected

Method 2

1 Press the left mouse button and move the cursor from right to left. (Note: the moving direction is from left to right.)

2 Objects that intersect with the rectangle are highlighted.

3 Release the left mouse button and these objects are selected.

5.1.2 Select By Menu Command

1 Select all & Inverse Selection command

To select all the objects in the drawing window, select **Edit**-> **Select All** (or press shortcut key Ctrl + A). (Fig. 5-6)

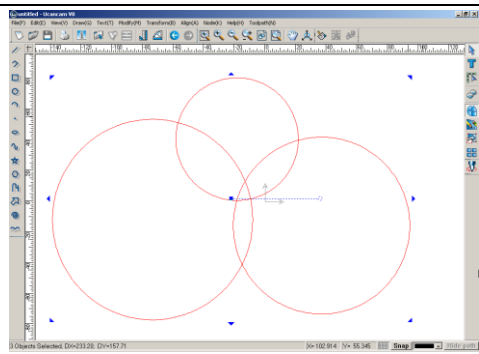


Fig. 5-6

If you select **Edit-> Inverse Selection**, then all the unselected objects are selected and all the selected objects are un-checked in the drawing window. (Fig. 5-7)

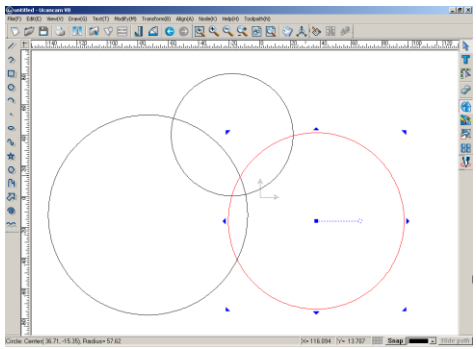


Fig. 5-7a (select the unneeded objects)

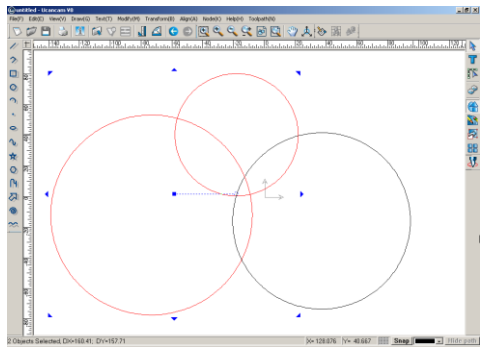


Fig. 5-7b (after inverse selection)

5.2 Transform Operation

5.2.1 Move

1 Select the object to be moved. When the cursor change in to “ ” the object can be move arbitrarily.

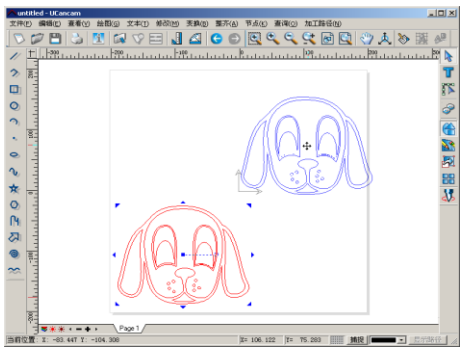


Fig. 5-8

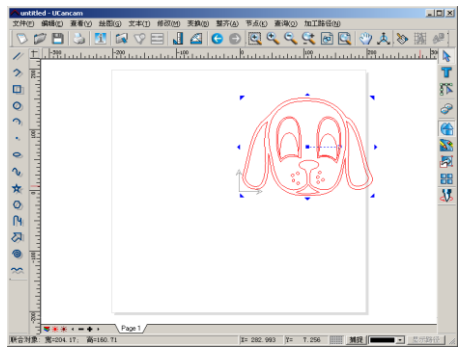


Fig. 5-9

REMARK: press **Shift** on keyboard, the object can be copied when it is moving

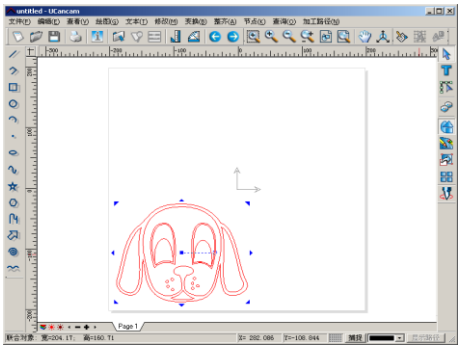


Fig. 5-10a

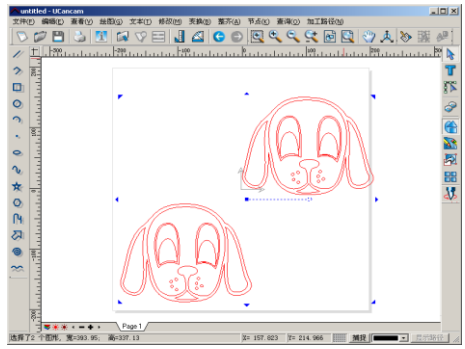


Fig. 5-10b

You also can move object by direction key on keyboard after selecting object by mouse. Keep on pressing direction key for a while can increase the speed of moving.

2 Click icon or click **Transform->Move** on menu bar, key in starting points coordinate (5, 5) in status bar and press **Enter** on keyboard. Then key in end point coordinate (150,150) in status bar and press **Enter** to finish operation Fig 5-11

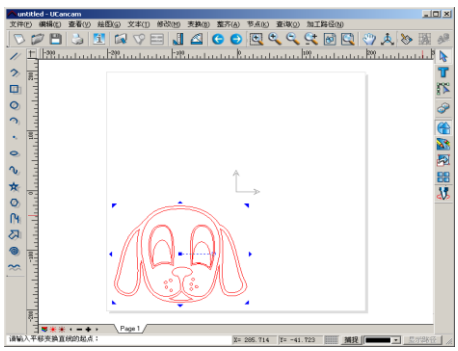


Fig. 5-11a

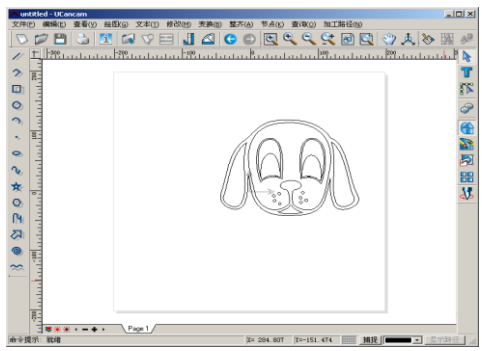


Fig. 5-11b

5.2.2 Scale

To scale an object

1 Select an object.

2 Move the cursor onto the arrows in the four corners of the object.

3 When the cursor changes into " "or " ", hold and drag the left mouse button.

You can also scale the object by moving the cursor onto the arrows on the sides of the selected object; when the cursor changes into " "or" ", hold and drag the left mouse button. (Fig. 5-12)

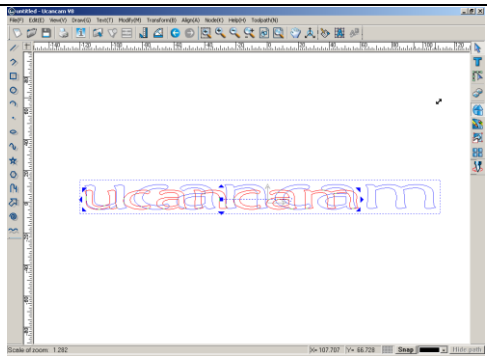


Fig. 5-12a (dragging the corner)

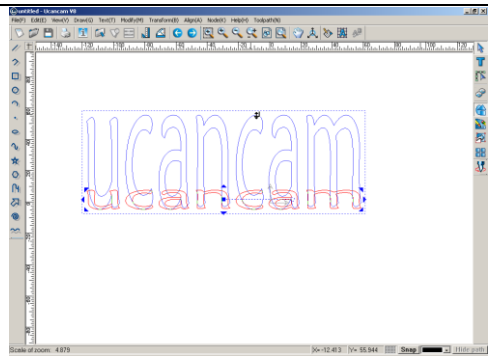


Fig. 5-12b (dragging the sides)

REMARK: Press and hold the **Shift** key, and drag one arrow on the highlighting box, and then the object will be scaled.

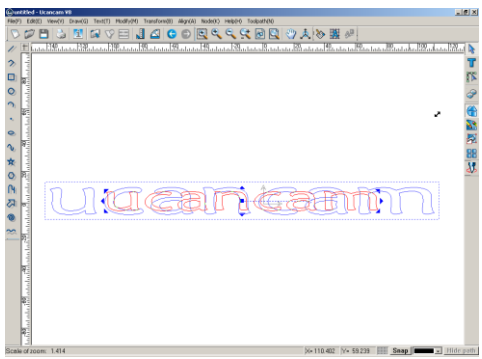


Fig. 5-13

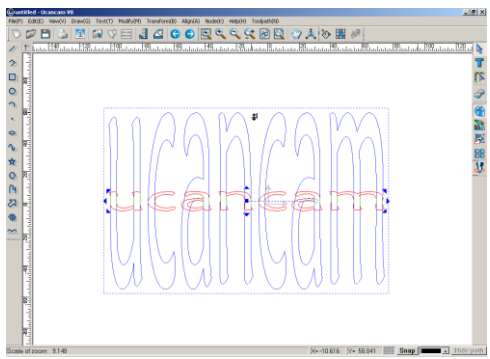


Fig. 5-14

You can also scale a selected object accurately by typing values.

1 Click the icon on **Transform Bar**, or click **Transform->Scale**.

2 The **Scale** dialog is displayed. (Fig. 5-15)

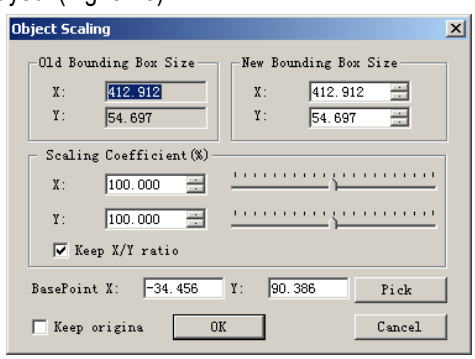


Fig. 5-15

Old Bounding Box Size: displays the width and height of the original object. (X is the width, and Y is the height.)

New Bounding Box Size: is for typing the new width and height value.

Scaling Coefficient: is to scale an object by changing X and Y percentum.

Keep X/Y ratio: If you enable Keep X/Y ratio, then the object will be scaled according to original

width to height ratio, which means changing the X value will cause the value in Y direction to change. If you un-checking "√" before Keep X/Y radio, then the change of the height and width of the object will not influence each other.

Keep Original: If you enable it, then the original graph will be kept in the drawing window after its scale is changed; if you un-checking "√" before keep original, then the original graph will not be kept in the drawing window.

Click the icon OK or the **Enter** key to validate the setup.

Note: Scaling function is not valid in **Editing Input** mode.

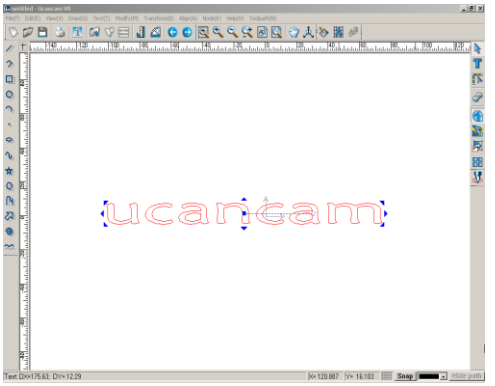


Fig. 5-16a (select the graph)

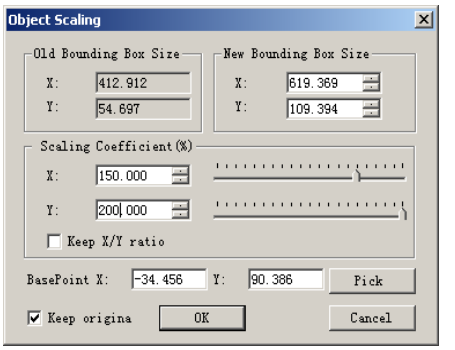


Fig. 5-16b (set the parameters)

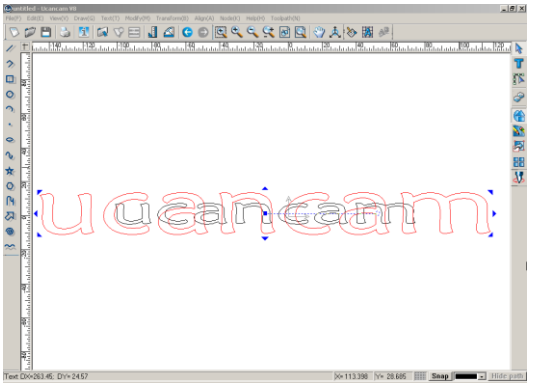


Fig. 5-16c (the effect after setup)

As we can see from Fig. 5-16, the base point in scale transforming is the center of the rectangle, but you can change its location in **Base Point** list in Editing Input mode after clicking **Text->Text Tools**.

You can input the coordinate value in **X** and **Y**, or you can also click the icon Pick and pick a coordinate point by clicking in the drawing window.

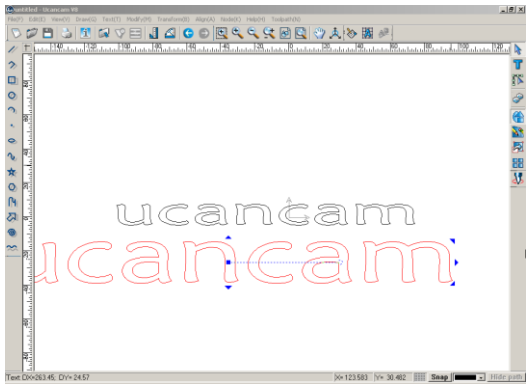


Fig. 5-17

REMARK: The base point is the center of the object and the object is scaled with this point as the center. That is to say the base point is the only point whose position is not changed during scaling. Baseline is the central line of the object. The object is scaled with this line as the center line. In other words, the base line is the only line whose position is not changed during scaling.

5.2.3 Rotation

There are several ways to rotate a selected object.

The commonly used method is shown below.

1 Select an object

2 Move the cursor into the highlighting box.

3 When the cursor changes into "↻", hold and move the left mouse button to rotate the object.

You can also rotate an object by pressing the **Ctrl** key and the left/right keyboard arrow key. The object will be rotated anticlockwise by holding the left keyboard arrow key, and it will be rotated clockwise by holding the right keyboard arrow key.

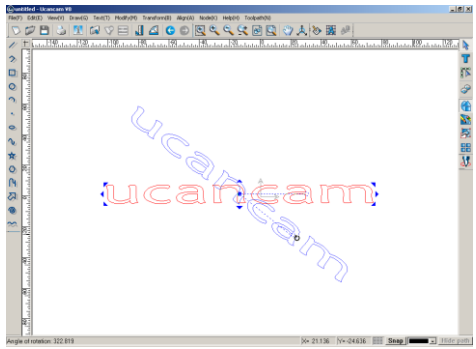


Fig. 5-18

REMARK: The original object will be preserved in the drawing window if you press the **Shift** key while rotating the object. (Fig. 5-19)

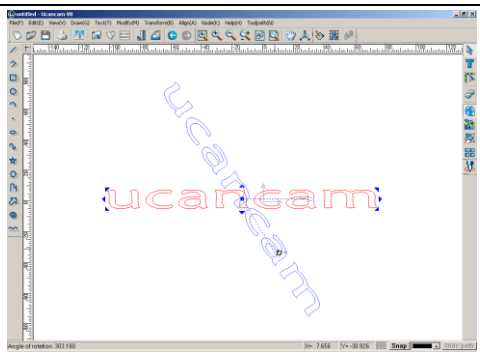


Fig. 5-19a (hold the **Shift** key)

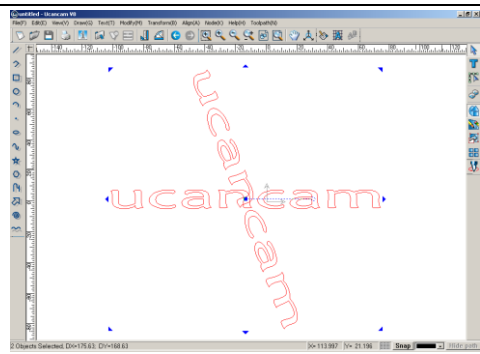


Fig. 5-19b (the original object is preserved in the drawing window)

To rotate an object accurately, there are two ways: **Mouse rotate** and **Angle rotate**.

- **Mouse Rotate**

1 Click the icon in **Transform Bar**, or click **Transform** -> **Mouse Rotate**.

2The words **Start of rotation line** are displayed in the status bar.

3 Input the coordinate, e.g. (10, 10), and press **Enter** key.

4 Then the words **End of rotation line** is shown in the status bar.

5 Input the coordinate and press **Enter**, and the object is rotated.

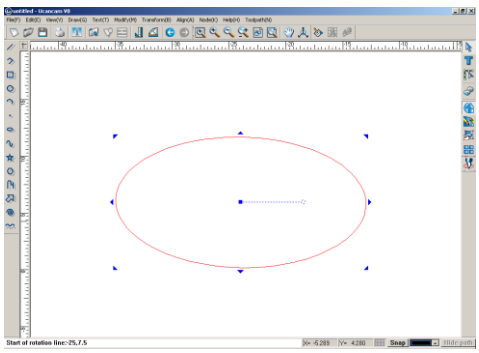


Fig. 5-20a (input the start rotation line)

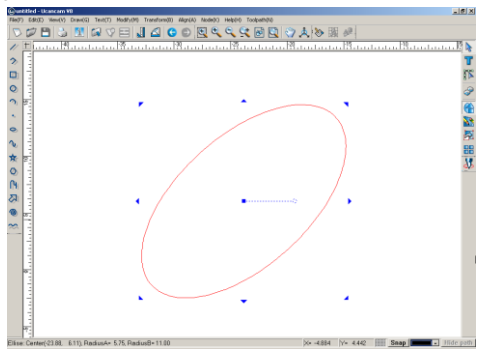


Fig. 5-20b (after inputting the end rotation line)

REMARK: The angle formed by the X-axis (the horizontal direction) and the rotation line is the rotation angle, and the starting point of the rotation line is the rotation center of the object.

- **Angle rotate**

1 Select **Transform**-> **Angle rotate**.

2 The words Angle of rotation line are shown in the status bar.

3 Type the value, e.g. 45, and press the Enter key. (Fig. 5-21)

REMARK: After selecting the object, each press **Space key** will cause the object to rotate by 90 degrees anticlockwise.

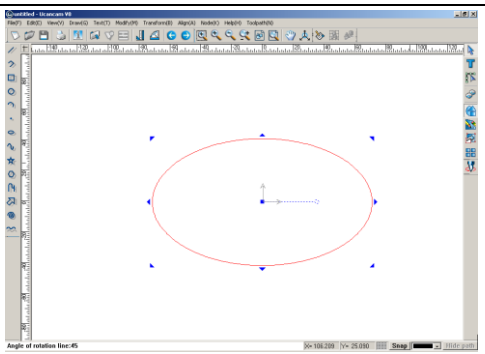


Fig. 5-21a (input the angle value 45 in the status bar)

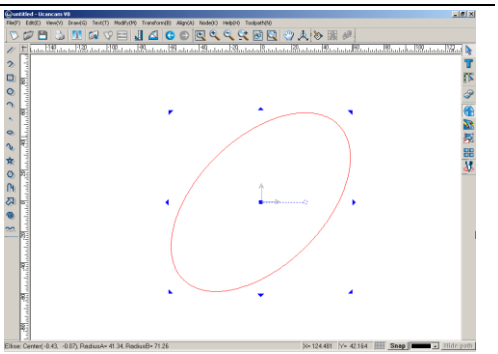


Fig. 5-21b (after rotation)

5.2.4 Mirror

There are three ways to mirror an object: horizontal mirror, vertical mirror and line mirror.

- **Horizontal mirror**

Horizontal mirror is to mirror the object with its horizontal center line as the axis.

1 Select an object.

2 Click the icon on **Transform Bar**, or click **Transform**-> **Horizontal mirror**.

- **Vertical mirror**

Vertical mirror is to mirror the object with its vertical center line as the axis.

1 Select an object.

2 Click the icon on the **Transform Bar**, or click **Transform**-> **Vertical mirror**.

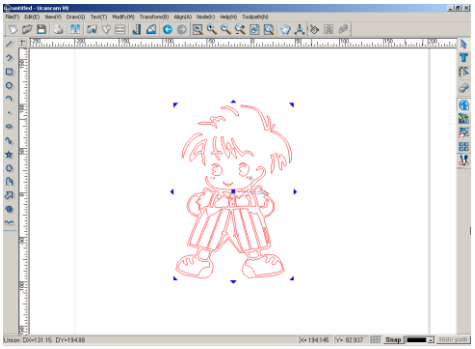


Fig. 5-24a (original)

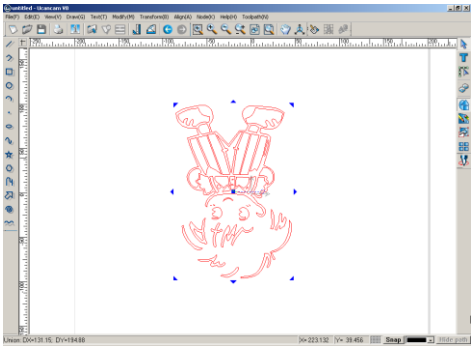


Fig. 5-24b (after horizontal mirroring)

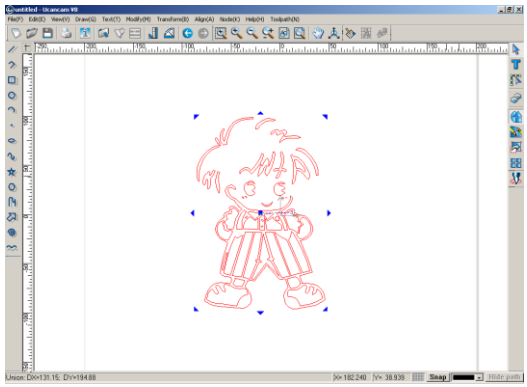


Fig. 5-24c (after vertical mirroring)

- **Line Mirror**

Line mirror is also provided by Ucancam.

1 Click the icon in **Transform Bar**, or click **Transform**-> **Line mirror**.

2 The words **Start of mirror line** are shown in the status bar.

3 Type a coordinate value, e.g. 25, 25, and press **Enter** key.

4 The words **End of mirror line** are shown in the status bar.

5 Type a coordinate value, e.g. 100,100, and press the **Enter** key.

6 The words **Keep original object** are shown in the status bar. Input "**Y**" to preserve the original object in the drawing window or "**N**" to remove the original object from the drawing window, and validate the command by pressing the **Enter** key.

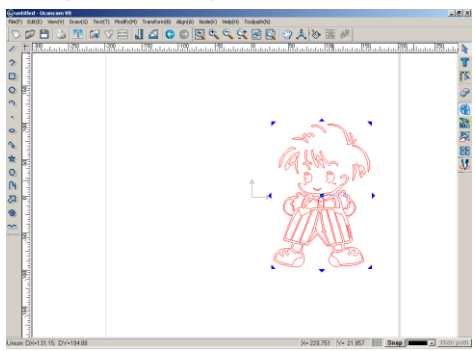


Fig. 5-25a (click **Line mirror**, and input the value of **start of mirror line**)

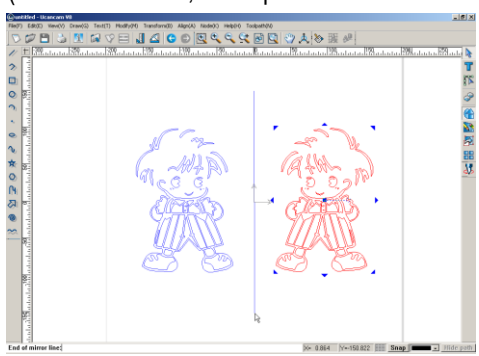


Fig. 5-25b (Type the value of **end of the mirror line**)

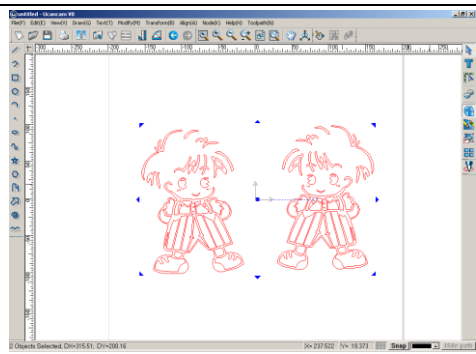


Fig. 5-25c (the result)

5.2.5 Shear

To shear an object

1 Select an object.

2 Hold the **Ctrl** key and at the same time move the cursor onto the arrows of the highlighting box.

3 When the cursor changes into or , hold the left mouse button and drag it.

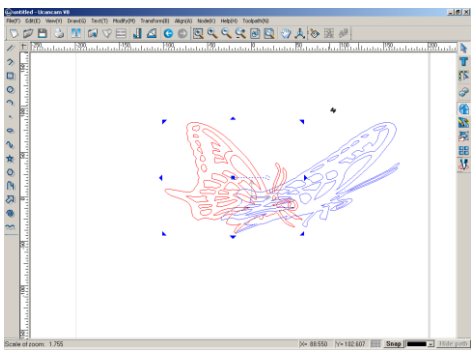


Fig. 5-28a (drag the mouse to shear the object)

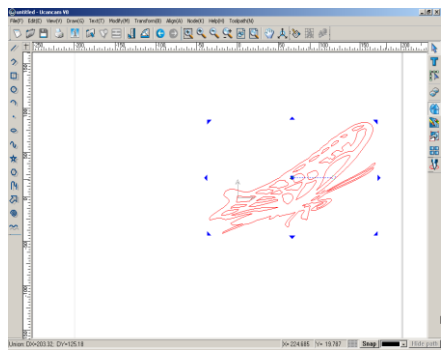


Fig. 5-28b (after shearing)

You can also shear an object accurately by using **shear** command.

Click the icon on **Transform Bar**, or click **Transform->Shear** to display a dialog. (Fig. 5-29)

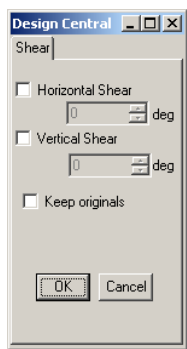


Fig. 5-29

Horizontal shear: is used to set horizontal shear level.

Vertical shear: is used to set the vertical shear level.

Keep originals: is used to preserve the original object in the drawing window after it is sheared.

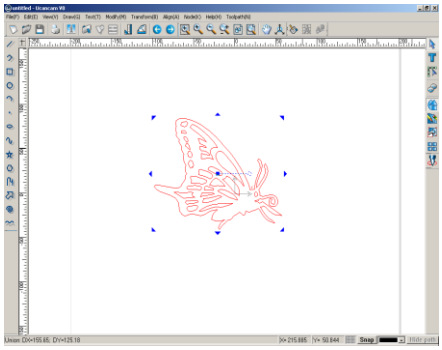


Fig. 5-30a (the original graph)

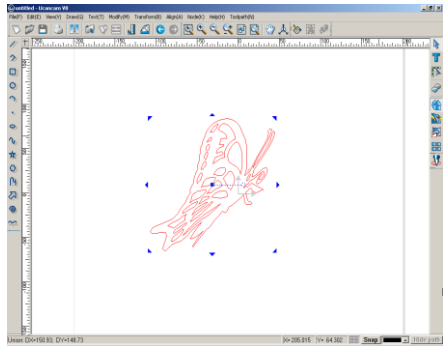


Fig. 5-30b (the effect after the object is inclined)

5.2.6 Arc Fit

You can change a Bezier curve, which is composed of small lengths, into a curve, which is composed of arcs. In this way, machining efficiency is greatly improved, because arcs take much less time to calculate during tool path output than Bezier.

To apply arc fit to an object

1. Select an object.
2. Click **Transform**->**Arc Fit** in the menu bar.
3. A dialog is displayed.
4. Set the parameters, and click on **OK** to validate the setup.

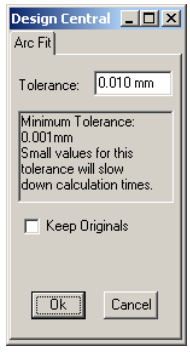


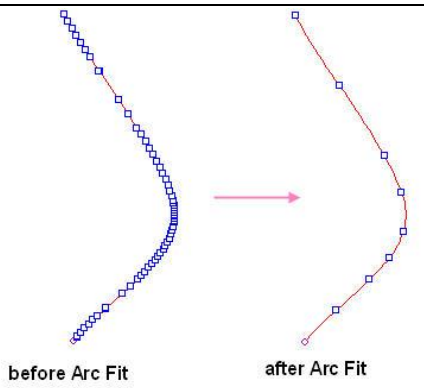
Fig. 5-31

Parameters

Tolerance: is the precision of arc fit.

Keep Originals: is to preserve the original object in the drawing window if you tick it.

REMARK: Arc Fit function is valid only to drawings which are composed of lines. It is not valid to images.



5.2.7 Line Fit

You can change a Bezier curve, which is composed of arc or curve, into a curve, which is composed of lines. That can be used for different needs.

To apply line fit to an object

1. Select an object.
2. Click **Transform->Line Fit** in the menu bar.
3. A dialog is displayed.
4. Set the parameters, and click on **OK** to validate the setup.

Parameters

Tolerance: is the precision of line fit.

Keep Originals: is to preserve the original object in the drawing window if you tick it.

5.3 Align

You can align several objects by using **Align** function.

5.3.1 To Align An Object

There are five ways to align an object: **Align on left, Align on right, Align to top, Align to bottom and Align on center.**

Align on left: is to align several selected objects along the left side of the first selected object. There are three ways to enable this function:

- Click the shortcut icon on **Aligning Bar.**
- Click **Align->Align on left** in the menu bar**.**
- Press **Ctrl + Num4.**

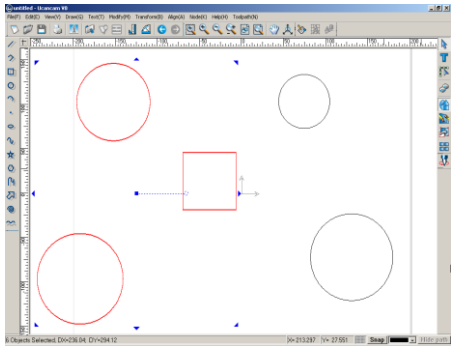


Fig.5-32a (original)

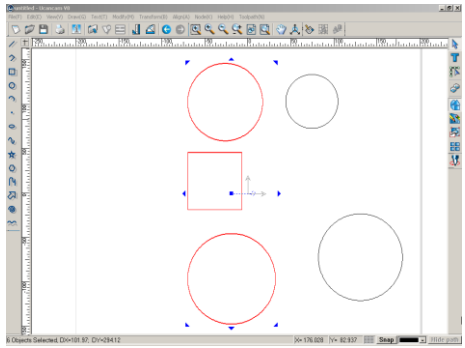


Fig. 5-32b (align on left)

Align on right: is to align several selected objects along the right side of the first selected object. There are three ways to enable this function.

- Click the shortcut icon on **Aligning Bar.**
- Click **Align->Align on right** in the menu bar**.**
- Press **Ctrl+Num6.**

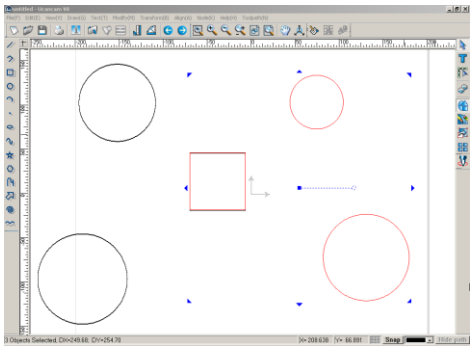


Fig. 5-33a (original)

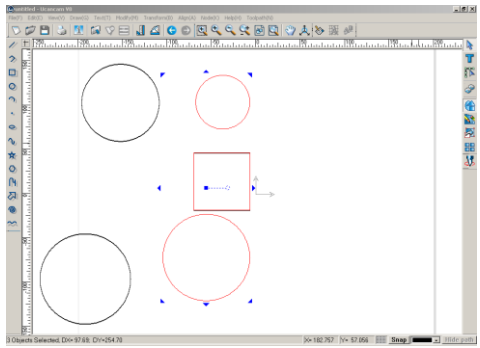


Fig. 5-33 b (align on right)

Align to top: is to align several selected objects along the top line of the first selected object. There are three ways to enable this function.

- Click the shortcut icon on **Aligning Bar.**
- Click **Align->Align to top** in the menu bar**.**
- Press **Ctrl+Num8.**

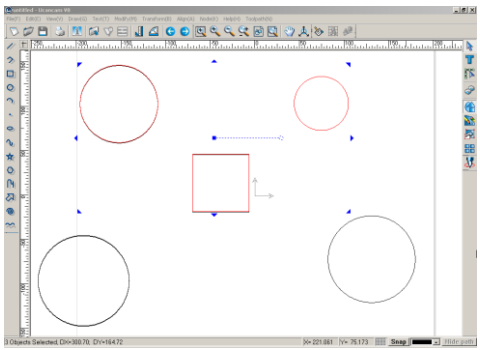


Fig. 5-34a (select the objects)

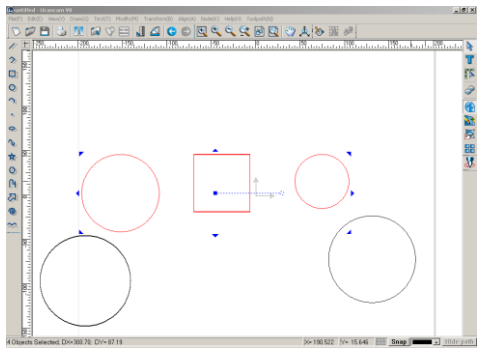


Fig. 5-34b (the effect after the object is aligned top)

Align to bottom: is to align several selected objects with the bottom line of the first selected object. There are three ways to enable this function.

- Click the shortcut icon on **Aligning Bar**.
- Click **Align->Align to bottom** in the menu bar.
- Press **Ctrl+Num2**.

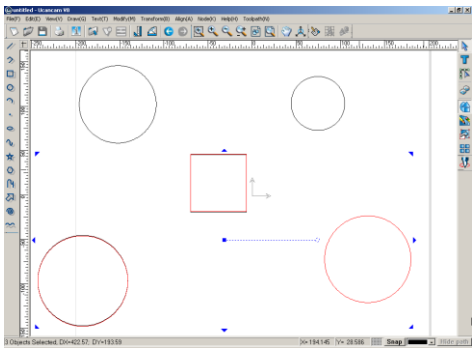


Fig. 5-35a (select the objects)

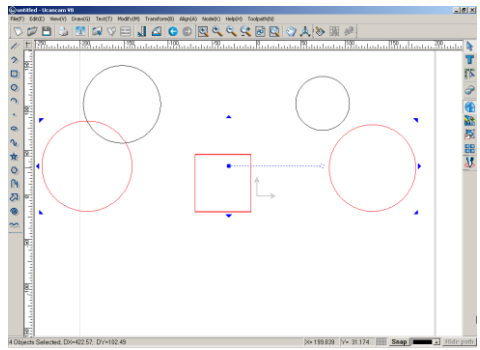


Fig. 5-35b (the effect after the objects are aligned bottom)

Align on center: is to make the center of several selected objects the same as that of the first selected object. There are three ways to enable this function.

- Click the shortcut icon on **Aligning Bar**.
- Click **Align->Align on center** in the menu bar.
- Press **Ctrl+Num5.**

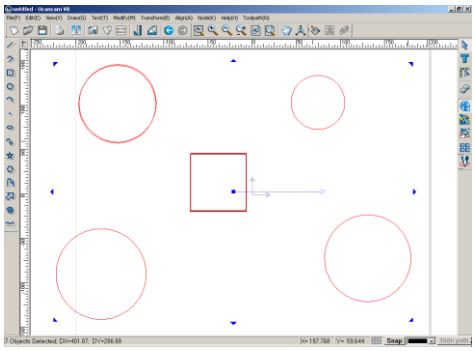


Fig. 5-36a (select the objects)

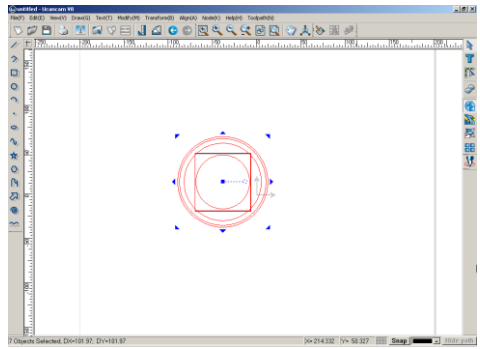


Fig. 5-36b (the effect after the object is aligned center)

5.3.2 Vertical Aligning & Horizontal Aligning

Vertical Aligning: is to align the vertical central line of several selected objects along that of the first selected object.

There are three ways to enable this function.

- Click the shortcut icon on **Aligning Bar**.
- Click **Align->Vertical aligning** in the menu bar.

- Press **Alt +V**

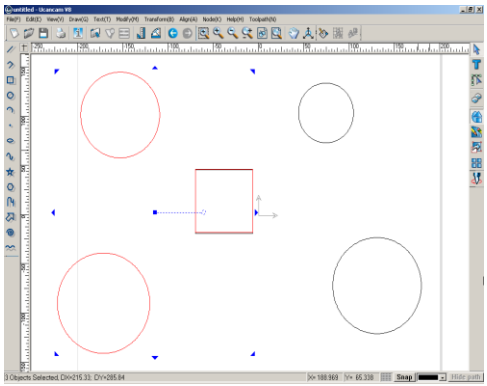


Fig. 5-37a (Select the objects)

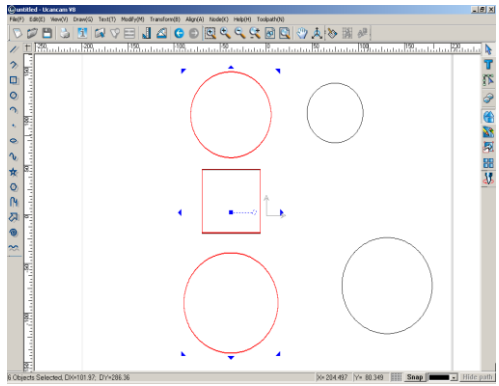


Fig. 5-37b (After Vertical aligning)

Horizontal Aligning: is to align several selected object along the horizontal central line of the first selected object. There are three ways to enable this function.

- Click the shortcut icon on **Aligning Bar**.
- Click **Align-> Horizontal aligning** in the menu bar.
- Press **Alt +H**.

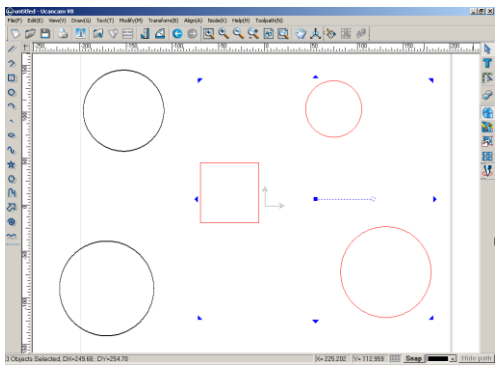


Fig. 5-38a (select the objects)

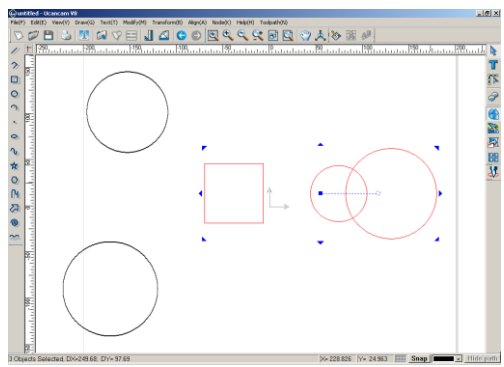


Fig. 5-38b (after horizontal aligning)

5.3.3 Space

There are two types of **Space**: **Horizontal spacing** and **Vertical spacing**.

Horizontal spacing: is to position the selected objects with the same space between each other horizontally.

There are three ways.

- Click the shortcut icon on **Aligning Bar**.
- Click **Align->Horizontal spacing** in the menu bar.
- Press **Alt + [**.

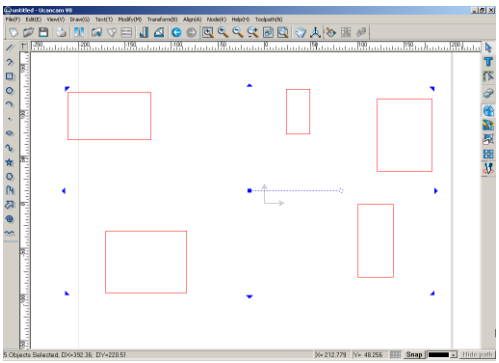


Fig. 5-39a (select the objects)

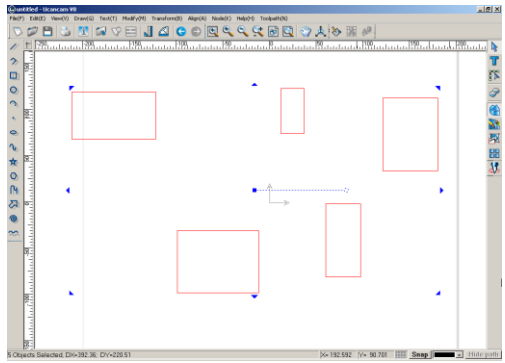


Fig. 5-39b (after **horizontal spacing**)

Vertical spacing: is to position several selected objects with the same space between each other vertically. There are three ways.

- Click the shortcut icon on **Aligning Bar**.
- Click **Align->Vertical spacing** in the menu bar.
- Press **Alt +]**.

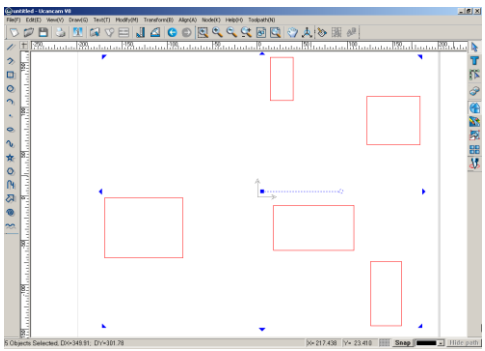


Fig. 5-40a (select the objects)

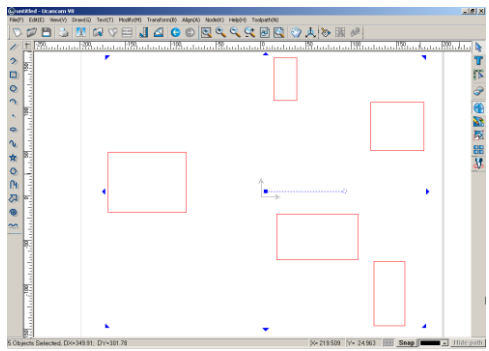


Fig. 5-40b (after **vertical spacing**)

REMARK: The number of the selected objects must be over two.

5.3.4 Same Size

To make the size of several selected objects the same, you can click **Transform->Scale**, but this method requires too much work and time. You can make it easier by using **Align ->Same Size** command on the menu bar. There are three ways to enable this function.

- Click the shortcut icon on **Aligning Bar**.
- Click **Align-> Same Size** on the menu bar.
- Press **Ctrl+Alt+A.**

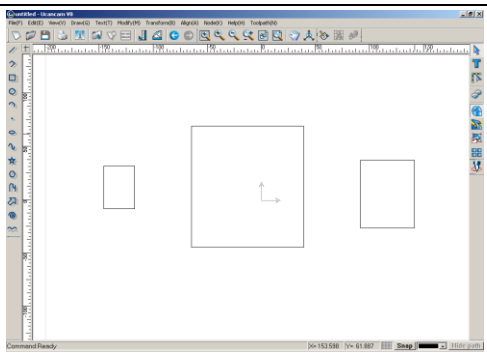


Fig. 5-41a (select the objects)

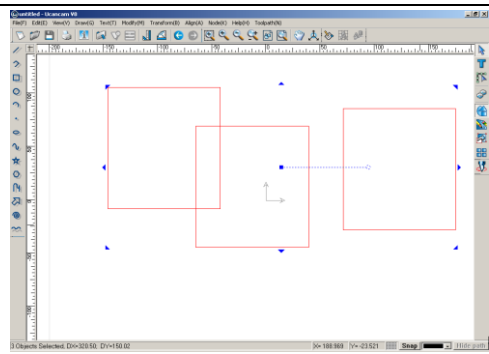


Fig. 5-41b (the effect)

There are two additional functions in Ucancam: **Same Width** and **Same Height**.

Same Width: is to make the width of the selected object the same as that of the first selected object. There are three ways to start this function.

- Click the shortcut icon in **Aligning Bar**.
- Click **Align**-> **Same Width** in the menu bar.
- Press **Ctrl**+ **Alt**+ **W**.

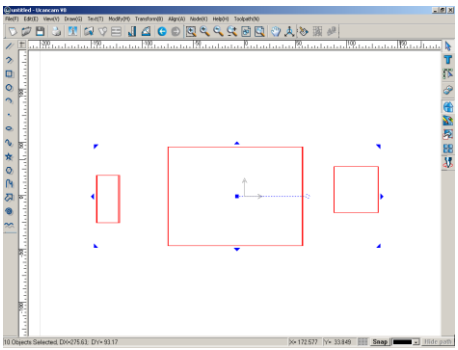


Fig. 5-42a (select the objects)

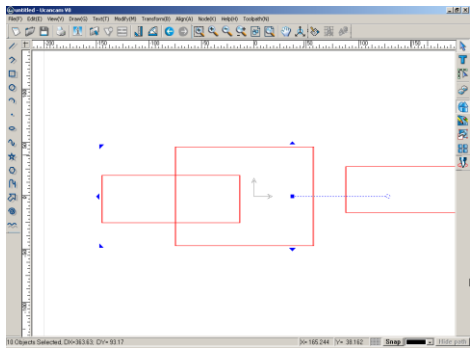


Fig. 5-42b (the effect)

Same Height: is to make the height of the selected objects the same as that of the first selected object.

There are three ways to enable this function.

- Click the shortcut icon in **Aligning Bar.**
- Click **Align-> Same Height** in the menu bar**.**
- Press **Ctrl+ Alt+ H**.

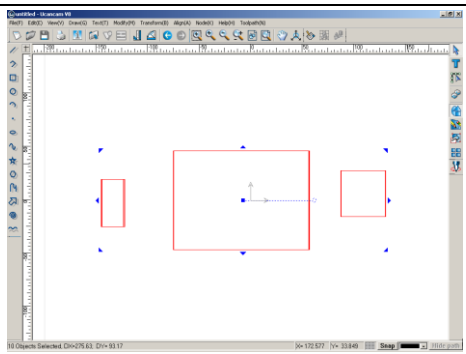


Fig. 5-43a (select the object)

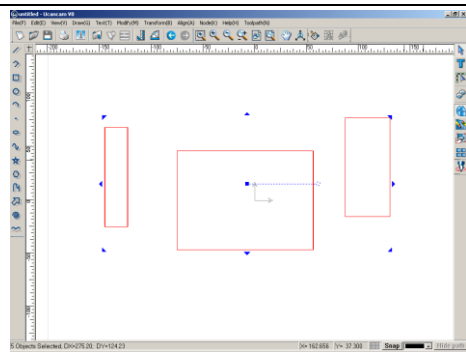


Fig. 5-43b (the effect)

5.4 Perspective Distortion

1 Select the graph.

2 Click on the icon on Transform Bar or click **Transform->Perspective Distortion**.

3 A net is displayed.

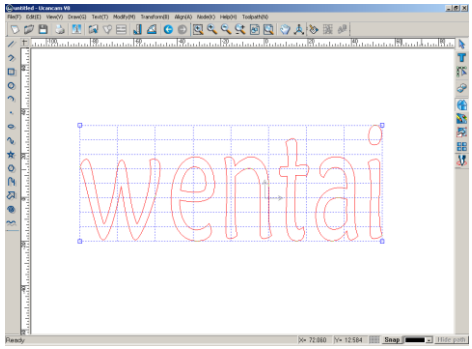


Fig. 5-44

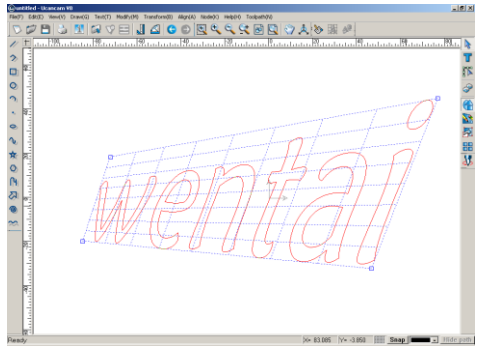


Fig. 5-45

4 Hold and drag the four panes in the corners of the net, and the object is distorted. (Fig. 5-48)
Press the right mouse button or the **Esc** key to exit the operation.

5.5 Envelop Distortion

This is used to change the form of the selected object.

1 Select an object

2 Click the icon on the **Transform Bar** or click **Transform->Envelop distortion**.

3 A box with several nodes and a dialog are shown. (Fig. 5-46)

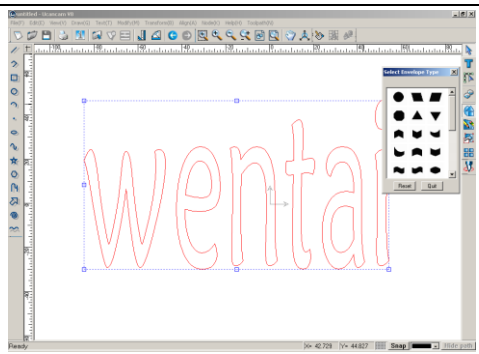


Fig. 5-46

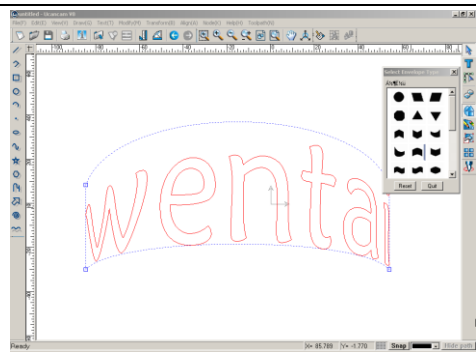


Fig. 5-47

4 Select a shape from the dialog Select Envelop Type (on the right of the drawing window). (Fig. 5-47)

REMARK: The object resumes the original shape by clicking Reset; to save the new shape, click Quit.

Then you can change the shape of the object by dragging the nodes on the selected frame.

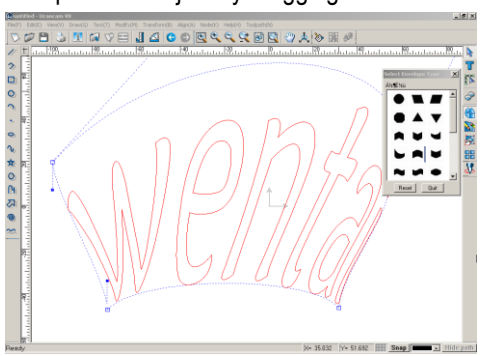


Fig. 5-48

Double click on a node of the frame to delete it; click on a point of the box to add a node.

When selecting several nodes at a time, the selected nodes will be filled with the color blue, and then you can move the selected nodes together by mouse. (Fig. 5-49)

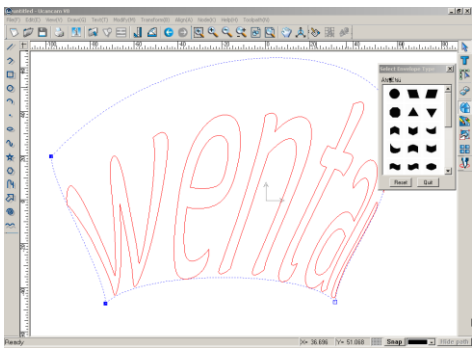


Fig. 5-49a (select several nodes)

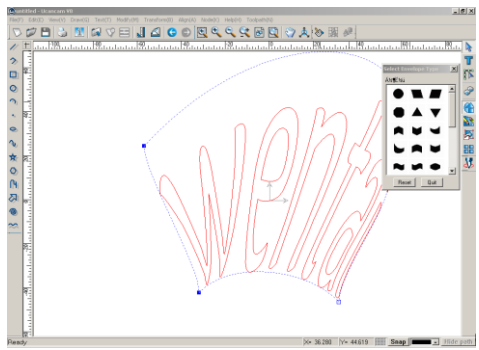


Fig. 5-49b (the effect)

5.6 Push And Pull Distortion

Push and Pull Distortion is to distort an object by pulling or pushing its base point.

1 Select an object.

2 Click on the icon on **Transform Bar** or click **Transform->Push and Pull Distortion**.

3 Pick the base point by clicking in the drawing window. (Fig. 5-50)

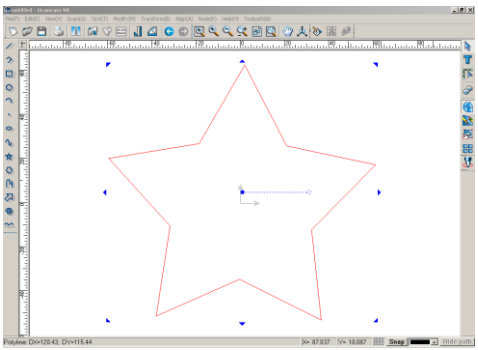


Fig. 5-50

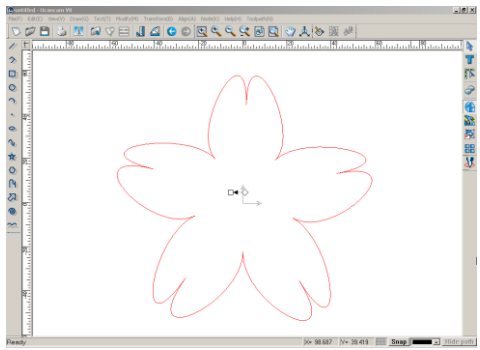


Fig. 5-51

4 Move the cursor onto the base point

5 When the cursor changes into **+,** hold and drag the left mouse button to distort the object. (Fig. 5-51)

6 Click the right mouse button or the **Esc** key on the keyboard to exit the operation.

5.7 Twist Distortion

This is to distort an object by rotating its base point.

1 Select an object.

2 Click on shortcut icon on **Transform Bar** or click **Transform->Twist Distortion**.

The base point is shown. (Fig. 5-52)

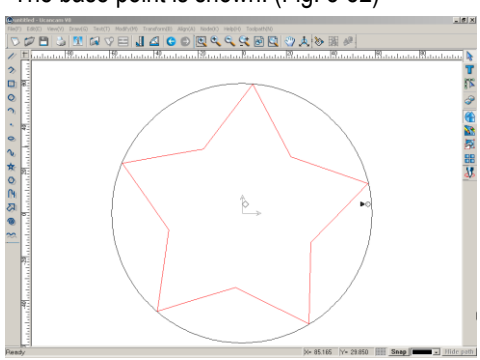


Fig. 5-52

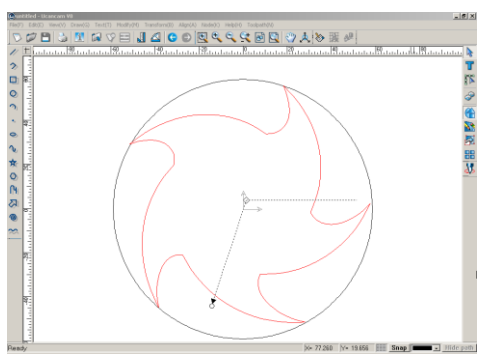


Fig. 5-53

3 Move the cursor onto the base point.

4 When the cursor changes into **+**,hold and drag the left mouse button to change the object into desired shape. (Fig. 5-53)

5 Press the right mouse button or the **Esc** key to exit the operation.

5.8 Auto Nesting

Several objects with various shapes and sizes can be arranged in a selected shape to save material. The following is an example.

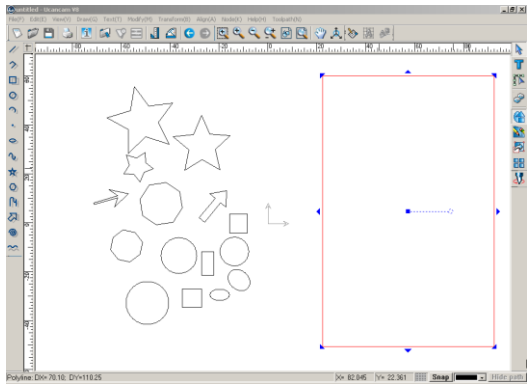


Fig. 5-54

1 Select all the objects.

2 Click on the icon on **Transform** Bar or select **Transform->Auto Nesting**

3 The cursor changes into .

4 Move the cursor onto the side of the shape of stock such as a rectangular.

5 When the rectangular turns light blue, click the left mouse button.

6 Then the dialog **Auto Nesting** is shown. (Fig. 5-55)

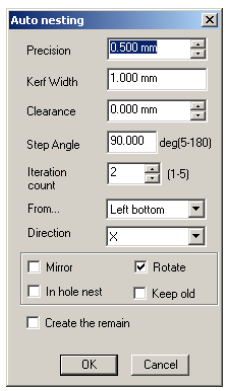


Fig. 5-55

Parameters

Precision: is the precision of auto nesting.

Kerf Width: is the width of kerf which equal to tool diameter

Clearance: you can set remain which is the shortest distance between the original part and part after machining. (Do not set the value too small; otherwise the material can not be machined properly.)

Step Angle: After setting step angle, objects will be automatically rotated according to the angle

Iteration count: the more iteration count you set, the better effort you will get .otherwise increase

iteration count, and you will spent more time to calculate it.

Mirror: some objects can be automatically mirrored to save the material during auto nesting.

In hole nest: some objects can be automatically nest in hole

Keep old: keep old object after nesting

After setting the parameters, click on **OK** to validate it.

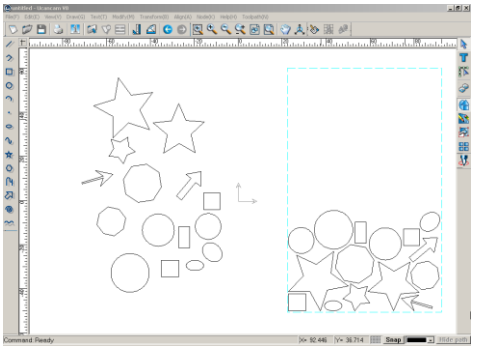


Fig. 5-56

5.9 Undo& Redo

5.9.1 Undo

Ucancam lets you cancel actions through any one of the following three methods.

- Click on the shortcut icon in **Standard Bar.**
- Click **Edit->Undo** in the menu bar**.**
- Press the shortcut key **Ctrl + Z.**

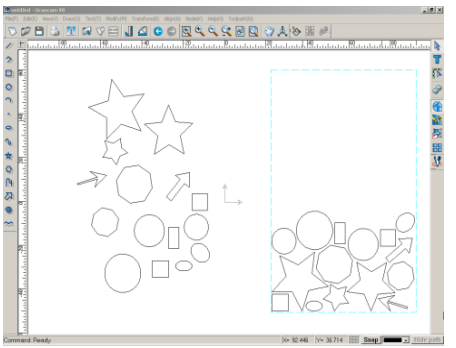


Fig. 5-57a

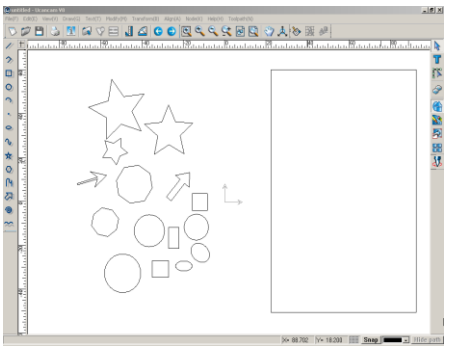


Fig. 5-57b

5.9.2 Redo

There are three ways to repeat an action.

- Click on the shortcut icon in **Standard Bar.**
- Click **Edit->Redo** in the menu bar**.**
- Press **Ctrl + Y.**

6. GRAPH EDITING

Editing operations include: **Copy, Paste, Cut, Delete, Trim, Divide, Offset, Expand, Join, Common, Not common, Subtract, Group, Ungroup,** and **Duplication.**

6.1 Copy Paste Cut

To copy an object

1 Select an object.

2 Select **Edit->Copy** or press **Ctrl + C**.

3 Select **Edit->Paste** or press **Ctrl + V**.

4 The words **Please input base point** is shown in the status bar. (Base point is the center of the object.)

5 Type a value (e.g. 10, 10) or just click in the drawing window to define the position of the base point.

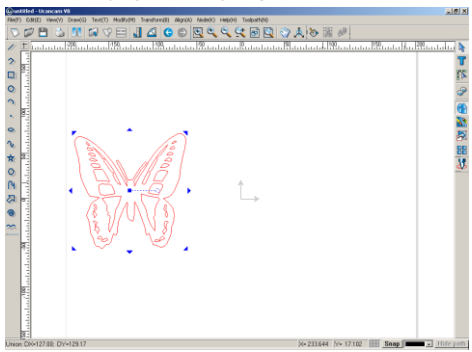


Fig. 6-1a (copy the selected object)

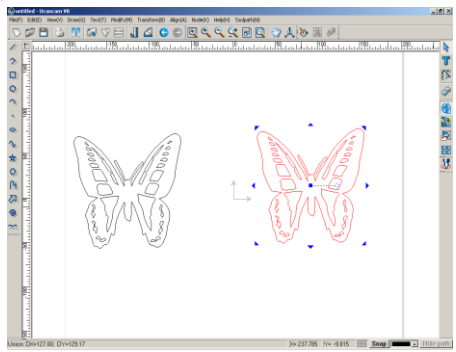


Fig. 6-1b (paste)

6.2 Delete

To delete an object

1 Select an object.

2 Click **Edit->Delete** or press **Delete** key in the keyboard.

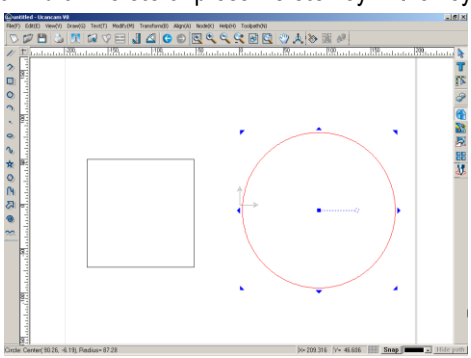


Fig. 6-2a (before deletion)

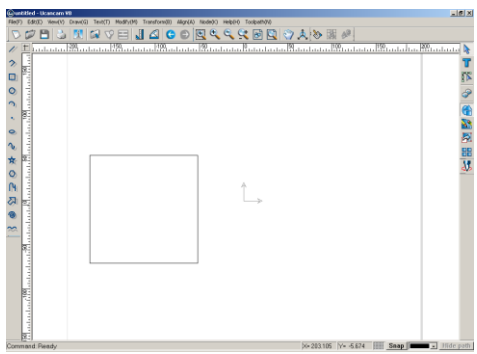


Fig. 6-2b (after deletion)

6.3 Trim

To trim an object

1 Select an object.

2 Click on the icon or click **Modify**->**Trim**.

3 The cursor then changes into scissors. Move the scissors onto the object, and the part pointed by the scissors will turn light blue.

4 Click the left mouse button, and that part of the object will be trimmed off. Click the right mouse button or press the **Esc** key to end the operation.

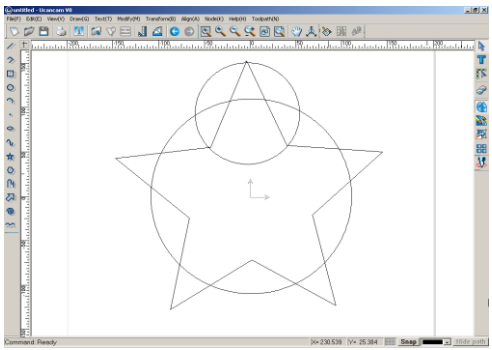


Fig. 6-3a (original graph)

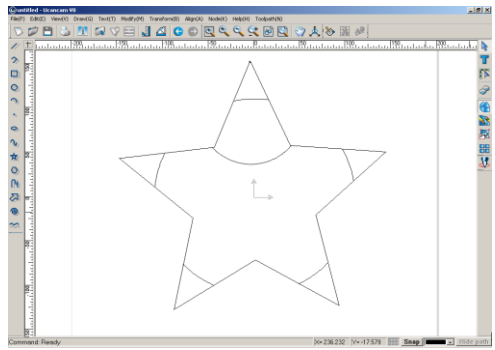


Fig. 6-3b (after being trimmed)

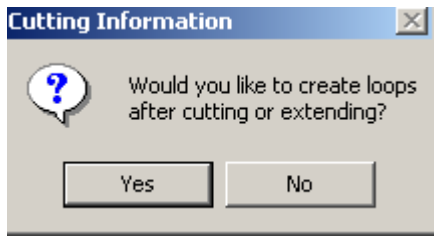


Fig. 6-4

REMARK: If you press the **Ctrl** key while trimming, then the selected part where appears will be separated from the original object.

The other function of **Trim** is to extend a line to intersect with another object such as a line or a curve/arc/combine curve/spiral. If there is no curve or line to intersect with it in the direction of the dragged line, then the line cannot be extended.

To extend a line

1 Select the line to be extended.

2 Click on the icon or click **Modify**->**Trim**.

3 Place the cursor in the blank area between the line and the other object which is going to intersect with it.

4 When a broken line appears between the line and the object, click the left mouse button.

5 The line is extended and intersects with the object (In the example below, the object is also a line.).

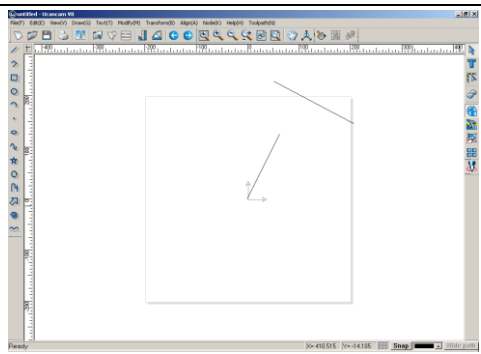


Fig. 6-5a (original)

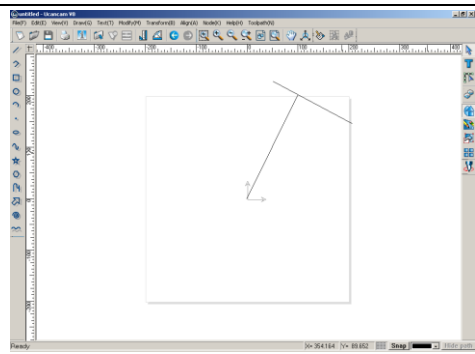


Fig. 6-5b (after being extended)

REMARK: The number of objects to be trimmed must be two or above, and in the case of trimming a compound graph, the graph must be ungrouped first.

6.4 Offset

Offset means to extend the object inward or outward by the same distance.

1 Select an object.

2 Click on the icon on **Modification Bar** or select **Modify->Offset**.

Then the following dialog is displayed. (Fig. 6-6)

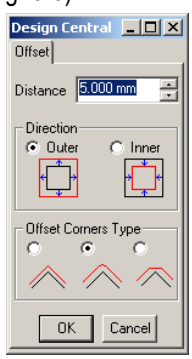


Fig. 6-6

There are two ways to offset an object: **Inner** and **Outer**.

Offset corners type includes: **Rounded, Sharpened, Chamfered.**

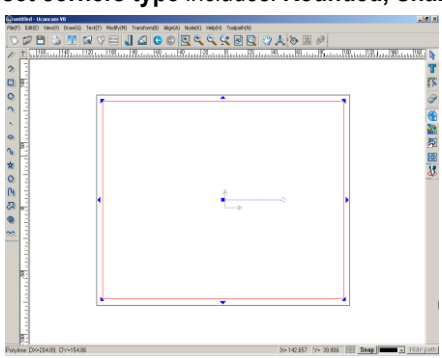


Fig. 6-7a (sharpened)

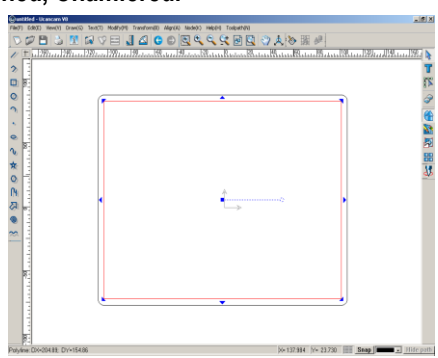


Fig. 6-7b (rounded)

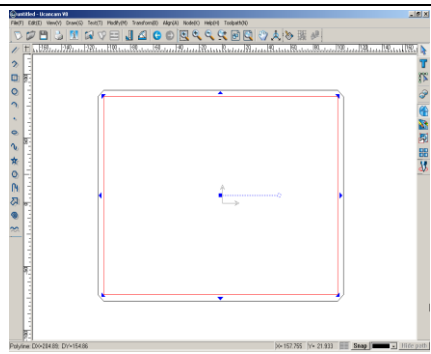


Fig. 6-7c (chamfered)

In Fig. 6-8, there is a curve; we now apply outer offset to it with a distance of 10mm. Then the effect is shown in Fig. 6-9.

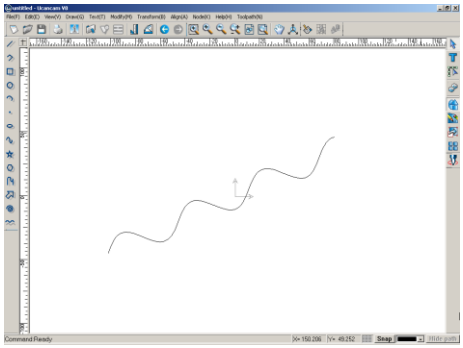


Fig. 6-8

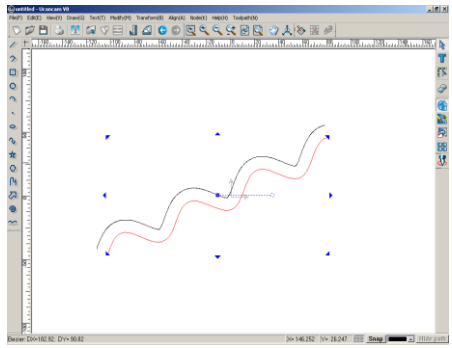


Fig. 6-9

6.5 Expand

Expand is to offset an object both inward and outward at the same time.

To expand an object

1 Select an object.

2 Click on the icon on the **Modification Bar** or click **Modify->Expand**.

3 Input the distance in the status bar, and press **Enter**.

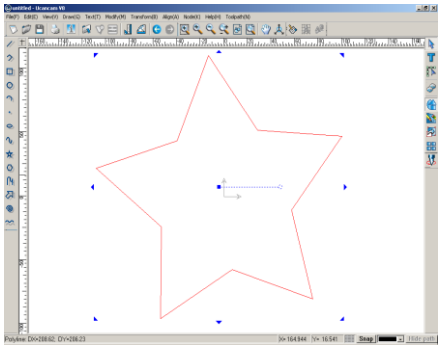


Fig. 6-10a (select the object)

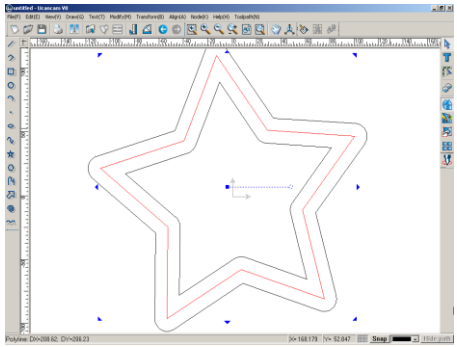


Fig. 6-10b (after being extended)

6.6 Close

Close is to link several curves (two or above) with lines.

Take the following as an example.

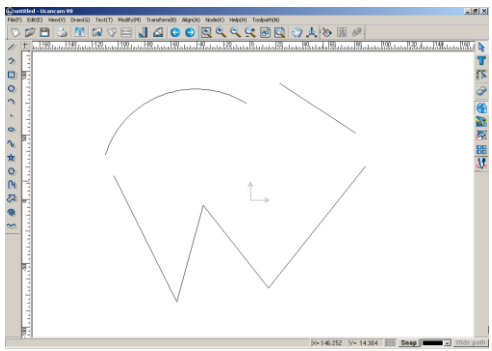


Fig. 6-11

1 Select all the objects

2 Click on the icon in **Modification Bar** or click **Modify**->**Close**. Then the following dialog is displayed. (Fig. 6-12

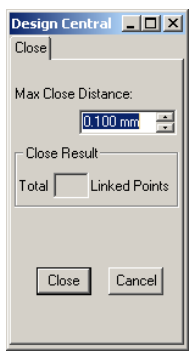


Fig. 6-12

3 Type a value in **Max Close Distance**.

Note: If the distance between two end points exceeds Max Close Distance, then the two points will not be linked.

4 Click on **Close** button in the dialog.

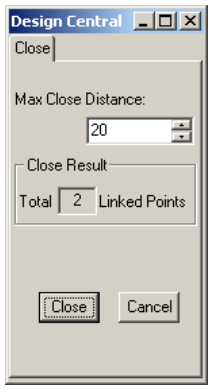


Fig. 6-13a

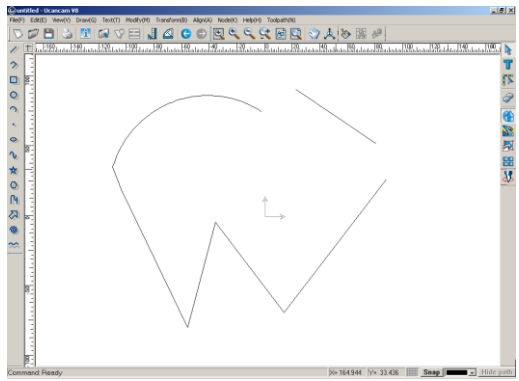


Fig. 6-13b (Two points are linked.)

Take another example. If we set the value of max close distance at 100mm, and click on the button **Close** in the dialog, then the result is shown in Fig. 6-14b. (All the points are linked)

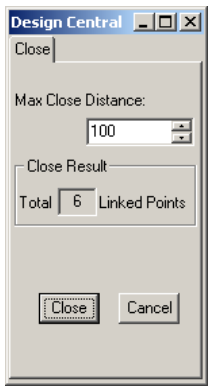


Fig. 6-14a

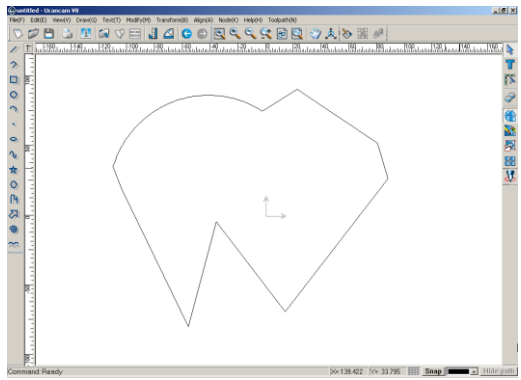


Fig. 6-14b

6.7 Direction

To change the direction of an object

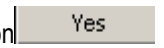
1 Select an object whose direction is to be changed.

2 Click on the icon on **Modification Bar** or click **Modify->Direction**.

3 The cursor changes into " ". Put the cursor on the object.

4 The object will turn into broken lines and its direction is shown. (Fig. 6-15)

5 Click the left mouse button on the object to display the **Flipping of Curve** dialog. (Fig. 6-16)

6 Click on 

to reverse its direction, and click on

to remain its direction unchanged. (Fig. 6-17)

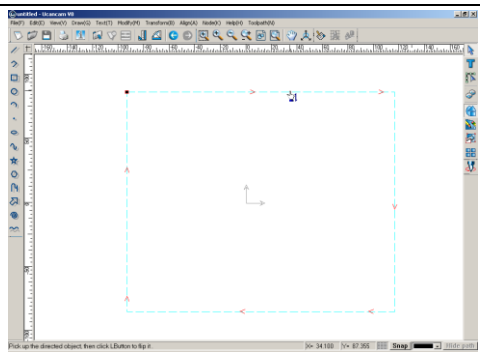


Fig. 6-15

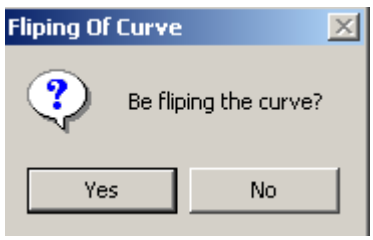


Fig. 6-16

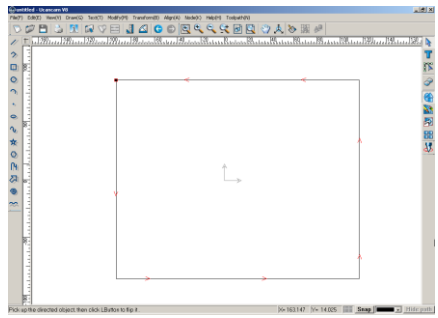


Fig. 6-17

Click the right mouse button in the drawing window or the **Esc** key in the keyboard, and then the displayed direction will be hidden.

6.8 Delete Overlay Loop

This function is to delete the overlaid parts of one graph or text in order to form tool path.

1 Select the object to be operated.

2 Select **Modify->Delete overlay loop**. (Fig. 6-18)

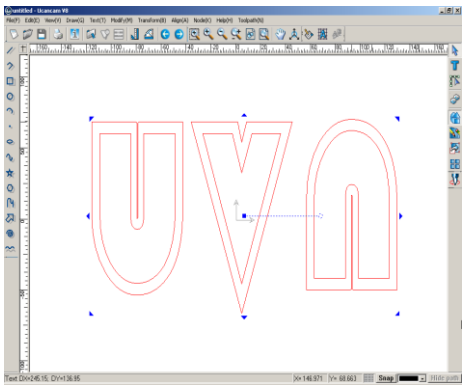


Fig. 6-18a (original)

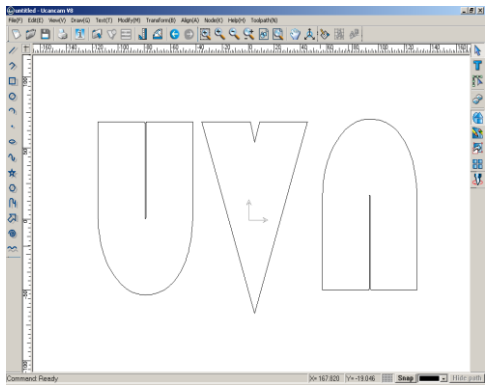


Fig. 6-18b (after deleting overlay loop)

6.9 Slice

Slice is to separate a graph into several smaller ones, and a close graph will remain close after this operation and the unclosed ones remain unclosed.

There are two types of Slice: **Simple slice** and **Complex slice.** Simple slice can be divided into linear slice, rectangular slice and ellipse slice; complex slice can be classified into parallel slice, circular slice and radial slice.

6.9.1 Simple Slice

Linear slice

1 Select an object.

2 Click on the icon on **Modification Bar** or click **Modify->Simple slice->Linear slice**.

3 Draw a line on the selected object. (The line must traverse the object.)

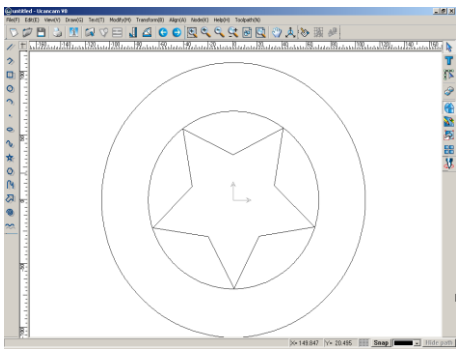


Fig. 6-19a (original)

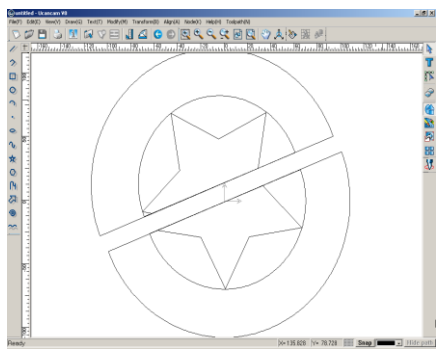


Fig. 6-19b (after being sliced)

4 Move one part of object by mouse.

Rectangular slice

1 Select an object.

2 Click on the icon on **Modification Bar** or click **Modify->Simple slice->Rectangular slice**.

3 Draw a rectangle on the selected object, and the object is sliced.

Note: The sides of the rectangle should intersect with the selected object.

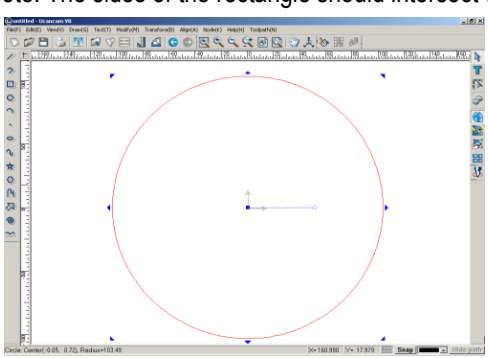


Fig. 6-20a (original)

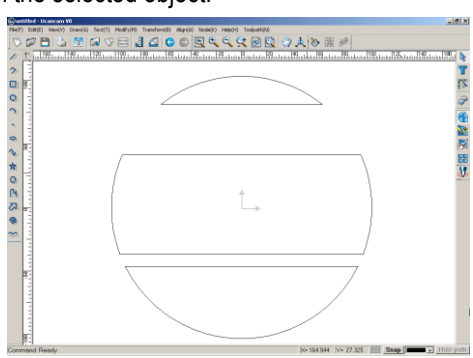


Fig. 6-20b (after being sliced)

Ellipse slice

1 Select an object.

2 Click on the icon on **Modification Bar** or click **Modify->Simple slice->Ellipse slice**.

3 Draw an ellipse on the selected object and the object is sliced.

Note: The border of the ellipse must intersect with the graph.

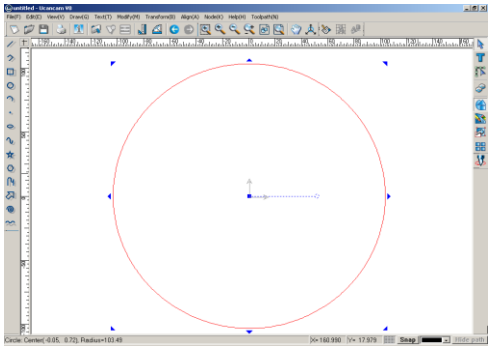


Fig. 6-21 (original)

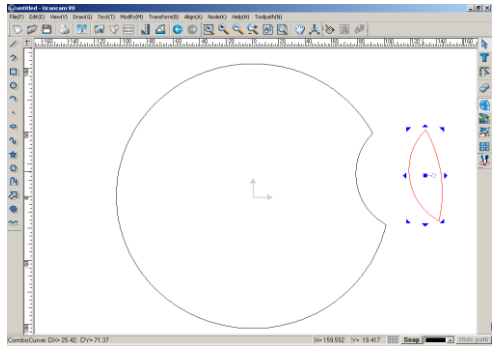


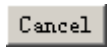
Fig. 6-22 (after being sliced)

6.9.2 Complex Slice

Parallel slice

1 Select an object and click on the icon on **Modification Bar** or click **Modify->Complex slice->Parallel slice**.

2 Then a dialog is shown. The parameters include line angle, preserve space, and remove space. Line angle is formed by the slicing line and the horizontal line; preserve space is the width of the preserved parts; remove space is the space between each two preserved parts.

3 Click on the icon  in the dialog or press the **Esc** key and the right mouse button simultaneously.

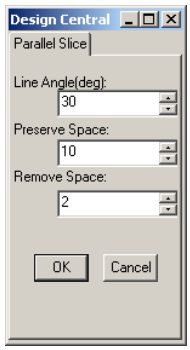


Fig. 6-23 (dialog)

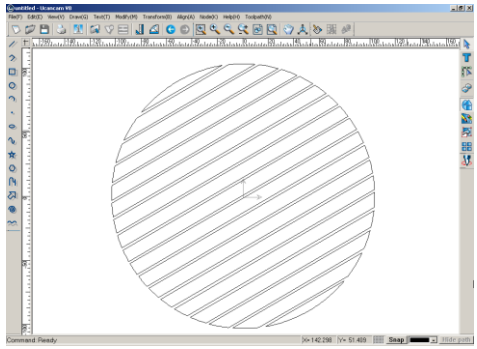


Fig. 6-24

Circular slice

1. Select an object.

2. Click on the icon on the **Modification Bar** or click **Modify->Complex Slice->Circular slice**.

3. A dialog is displayed (Fig. 6-25).

The parameters include start radius, preserve space and remove space.

4 After setting the values, click **OK** to validate the operation and click **Cancel** in to quit the operation.

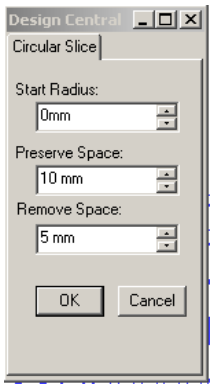


Fig. 6-25

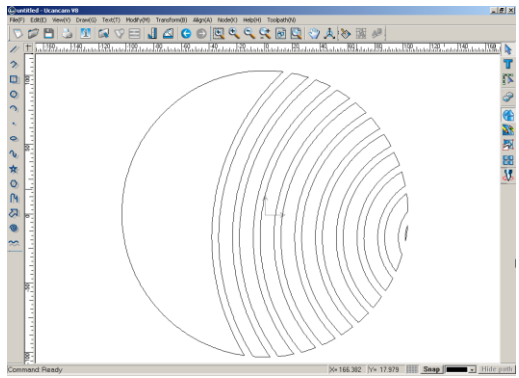


Fig. 6-26

Radial slice

1. Select the object to be sliced.

2. Click on the icon on **Modification Bar** or click **Modify**->**Complex Slice**->**Radial Slice**.

3. A dialog is displayed. (Fig. 6-27)

The parameters include: start angle, keep angle and remove angle. Start angle is for setting the position of the radial area; keep angle is the angle of the preserved parts; remove angle is the angle between each two preserved parts.

After typing the values, click **OK** to validate the operation and click **Cancel** or press the right mouse button to exit the operation.

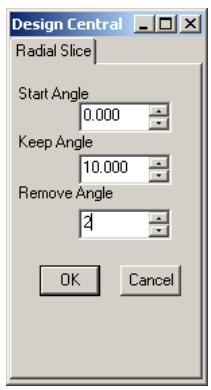


Fig. 6-27

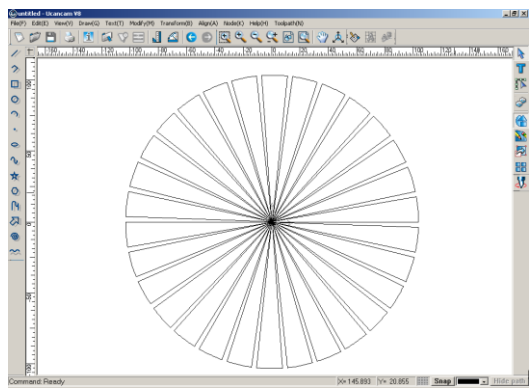


Fig. 6-28

6.10 Divide

Divide is to separate an object into several parts by defining dividing points.

To divide an object

1 Select the object to be divided.

2 Click on the icon in **Modification Bar** or click **Modify**->**Divide**.

3 The words **Please input the number of divisions** are shown in the status bar.

4 Type a value and press **Enter.**

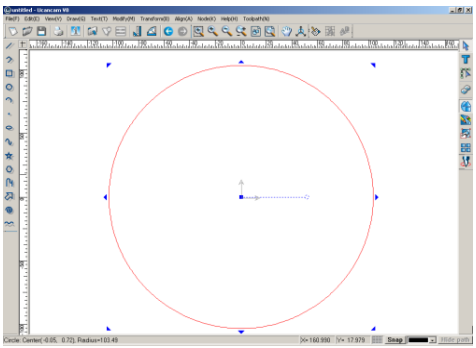


Fig. 6-29a (original)

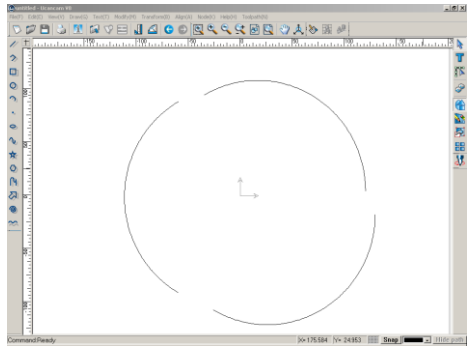


Fig. 6-29b (after being divided)

6.11 Boolean Operation

Boolean operation includes join, common, not common and subtract.

Take the following graph as an example.

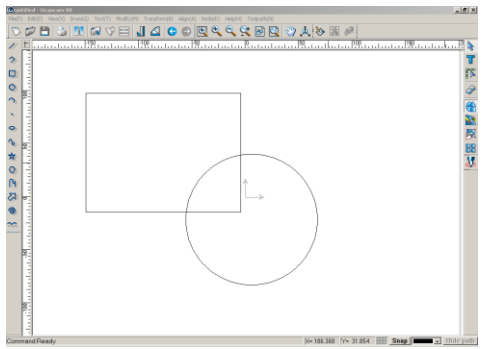


Fig. 6-30

Join

1 Select the two objects to be joined.

2 Click on the icon on **Modification Bar** or click **Modify** ->**Join**. The result is shown below.

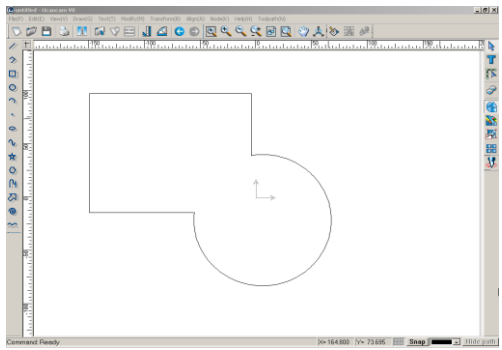


Fig. 6-31

Common

1. Select two objects.

2 Click on the icon on **Modification Bar** or click **Modify**-> **Common**. The result is as follows.

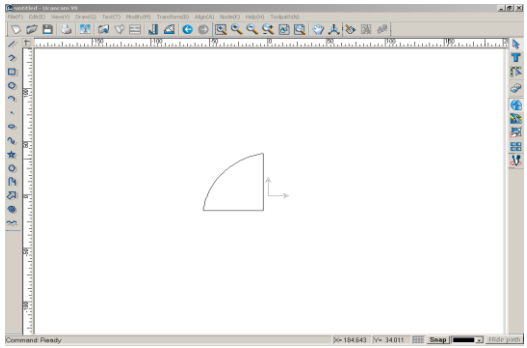


Fig. 6-32

Subtract

1 Select the two objects.

2 Click on the icon on **Modification Bar** or click **Modify**-> **Subtract**,

If you select then rectangle before selecting the circle, the result is shown in Fig. 6-33; if you select the circle first and then select the rectangle, the result will be as shown in Fig. 6-34.

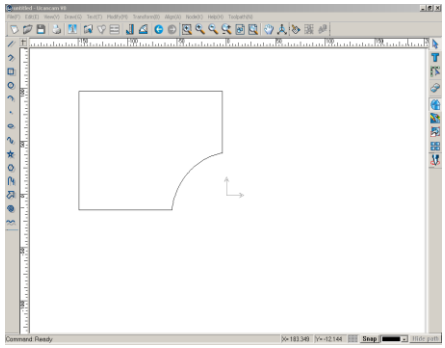


Fig. 6-33

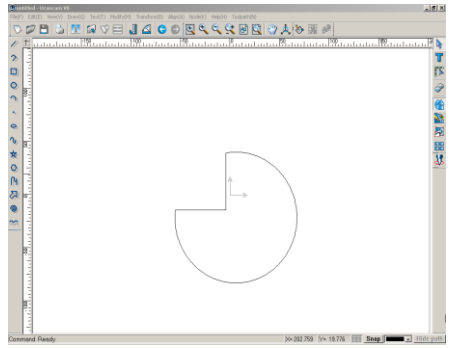


Fig. 6-34

Not common

1 Select the two objects.

2 Click on the icon on **Modification Bar** or click **Modify** ->**Not Common**. The following is the result.

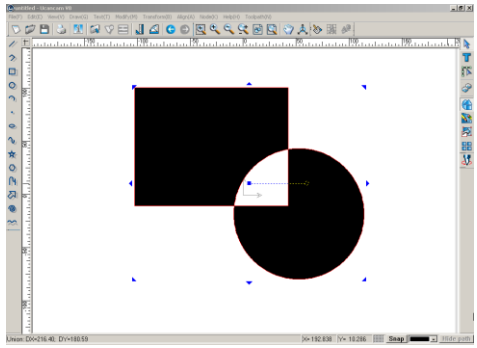


Fig. 6-35

6.12 Duplication

Array Duplication

1 Click on the icon on **Modification Bar** or click **Modify**-> **Array Duplication**.

2 A dialog is displayed. (Fig. 6-36)

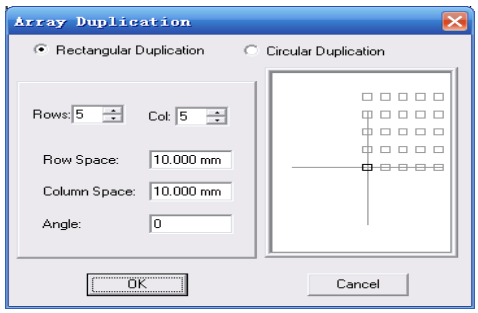


Fig. 6-36 (circular duplication)

Two types of Array Duplication: Reclangular Duplication and Circular Duplication.

Parameters in rectangular duplication include:

Row: is the number of rows.

Col: is the number of column

Row Space: is the space between every two rows.

Column Space: is the space between every two columns.

Angle: is formed by the bottom row and the positive direction of X axis.

3 After entering the values, click on the icon

or the **Enter** key to finish the setup.

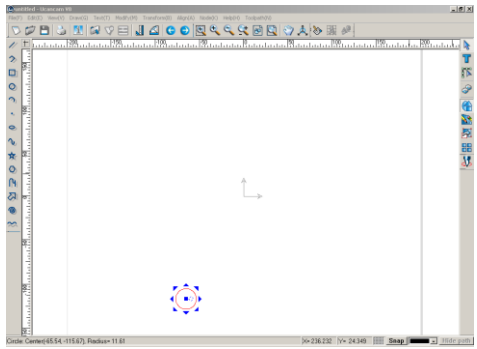


Fig. 6-37a (draw a circle)

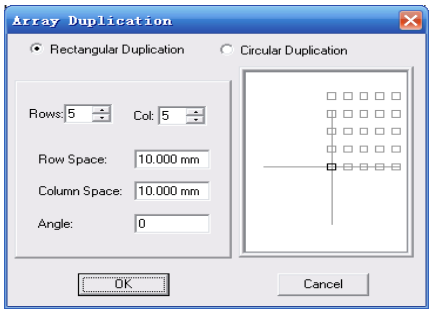


Fig. 6-37b (set the value)

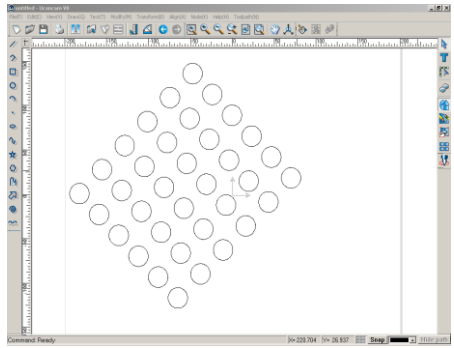


Fig. 6-37c (the result)

REMARK: The value of row space and column space can be negative numbers; it means that the duplicated objects will be placed in the negative X-axis direction.

Parameters in circular duplication include:

Center point: is to define the position of the center point of the circle. You can input the value directly; or you can click on Pick, and then click in the drawing window to fix the center point position of the circle.

Total: is the total number of the objects to be duplicated.

Angle: is the angle formed by the first and last duplicated object on the circle.

Rotating object: is to rotate the duplicated object

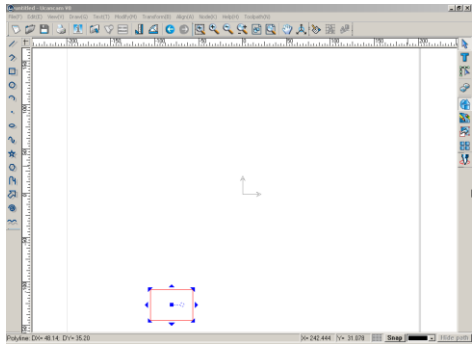


Fig. 6-38a (original)

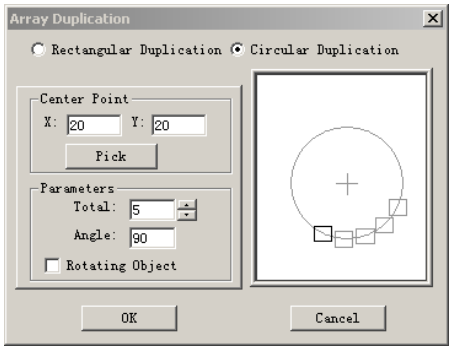


Fig. 6-38b (set the parameters)

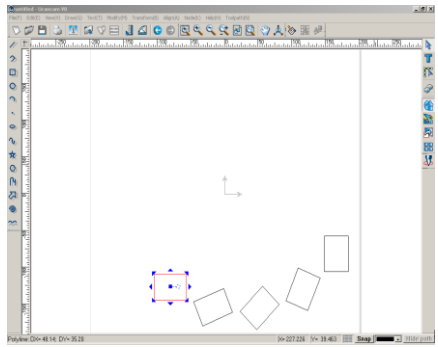


Fig. 6-38c (the result)

Duplication along a curve

This is to duplicate the selected object along a curve.

1 Draw a curve.

2 Select the object to be duplicated.

3 Click **Modify**-> **Duplication along A Curve**.

4 The words **Please select a curve** are shown in the status bar.

5 Move the cursor onto the curve.

6 When the cursor changes into , click the left mouse button. A dialog is displayed. (Fig. 6-39)

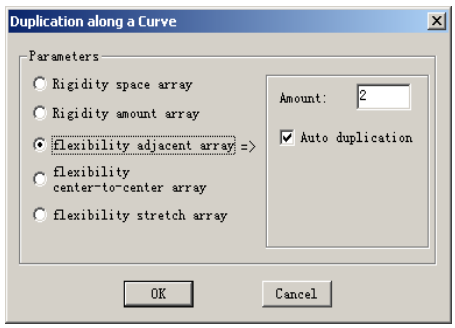


Fig. 6-39

Parameters

Rigidity space array: The object is duplicated along the curve with the same distance between each two objects.

Rigidity amount array: The amount is the total amount of the objects duplicated to the end of the curve with the same distance between each two objects.

Flexibility adjacent array: Check “Auto duplication” and then the object is duplicated along the curve with their centers on the line. If you do not check “Auto duplication”, then the object is duplicated according to the actual amount you set in the **Amount** list. The object is duplicated with no space between each two of them.

Flexibility center-to-center array: The object is duplicated along the curve with the same distance between the centers of each two objects.

Flexibility stretch array: The object is duplicated automatically with objects all along the curve.

7. After setting the parameters, click on OK to end the setup.

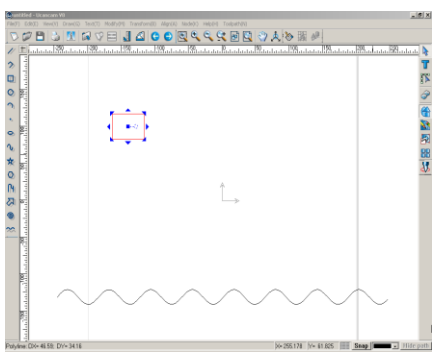


Fig. 6-40a (select the object)

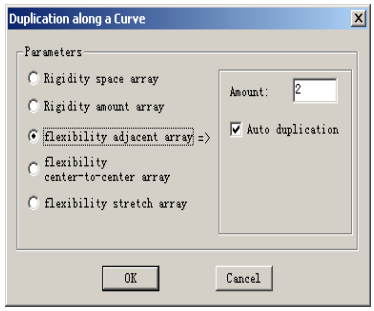


Fig. 6-40b (set the parameters)

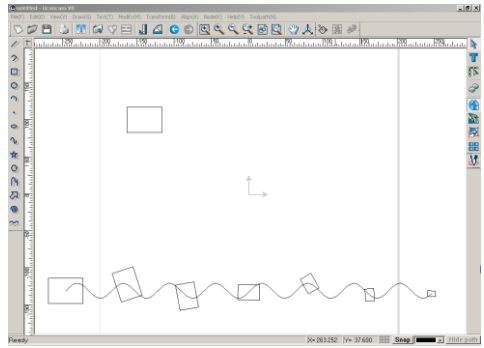


Fig. 6-40c (the result)

Duplication along a Line

This is to duplicate an object along a line.

1 Select the object to be duplicated.

2 Click on the icon on **Modification Bar** or click **Modify** ->**Duplication along a Line**.

3 A dialog is displayed. (Fig.6-41)

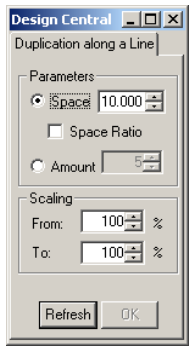


Fig. 6-41

Parameters

Space: is the distance between each two duplicated objects.

Amount: is the number of the duplicated objects.

Scaling: is the ratio of the size of the first duplicated object and the last duplicated object to that of the original object.

Refresh: is to validate the setting.

4. Set the values and click on **Refresh**.

5. Click in the drawing window to pick up the position of the first duplicated object. Move the mouse to the desired position.

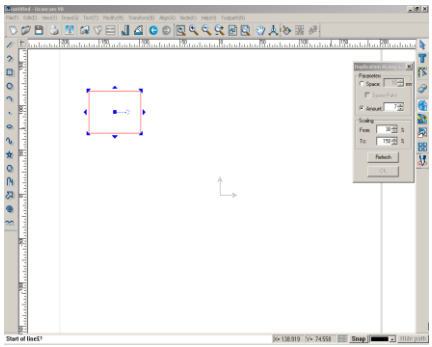


Fig. 6-42a (enter the value)

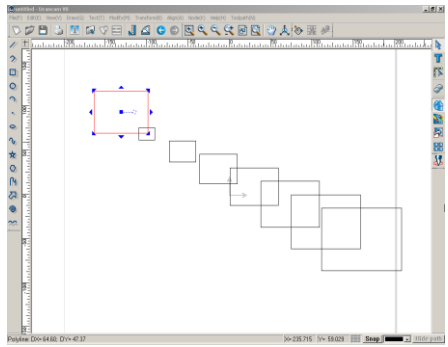


Fig. 6-42b (the result)

Duplication along an Arc

1 Select the object to be duplicated.

2 Click on the icon on the **Modification Bar** or click **Modify**-> **Duplication along an Arc**.

3. A dialog is displayed. (Fig. 6-43)

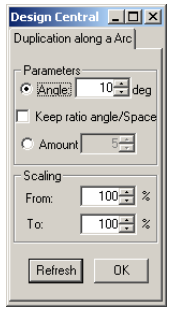


Fig. 6-43

Parameters

Angle: is formed by every two duplicated objects close to each other.

Keep Ratio Angle: by selecting this function, the duplicated objects are positioned vertically to the arc.

Amount: is the number of the duplicated objects.

Scaling: is the ratio of the size of the first duplicated object and the last duplicated object to that of the original object.

Refresh: is to validate the setting.

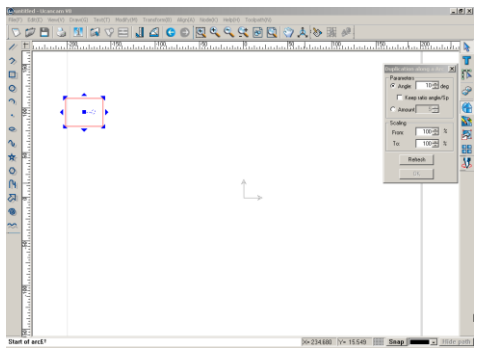


Fig. 6-44a (original)

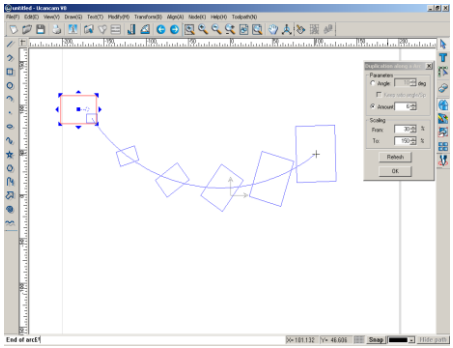


Fig. 6-44b (enter value)

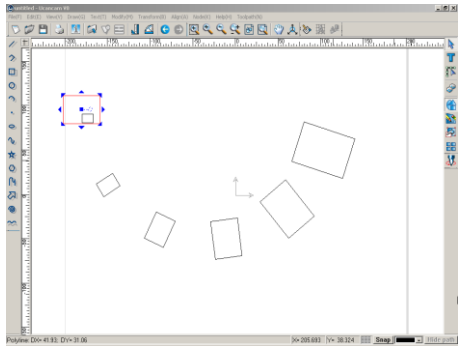


Fig. 6-44c (the effect)

Duplication along a Spiral Curve

1 Select the object to be duplicated.

2 Click on the icon on **Modification Bar** or click **Modify**-> **Duplication along a spiral curve**.

3 A dialog is displayed. (Fig. 6-45)

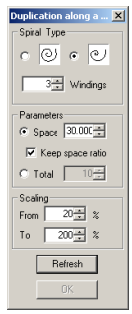


Fig. 6-45

Parameters

Space: is the distance between each two duplicated objects.

Keep space ratio: means the space between the objects is adjusted automatically.

Amount: is the number of the duplicated objects.

Scaling: is the ratio of the size of the first and last duplicated object to that of the original object.

Refresh: is to validate the setting.

4 Enter the values and then click the left mouse in the drawing window to pick up the position of the center of the spiral.

5 Move the mouse until the desired result is reached. Then click the left mouse button in the drawing window to end the setup.

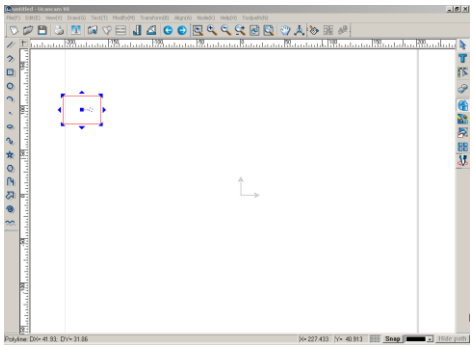


Fig. 6-46a (original)

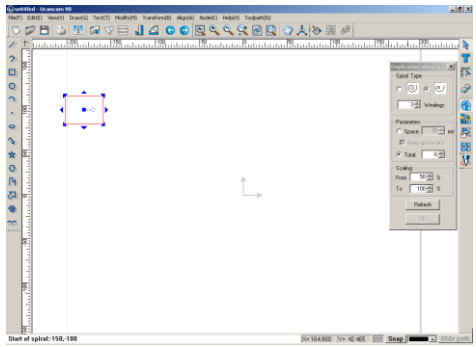


Fig. 6-46b (input parameters)

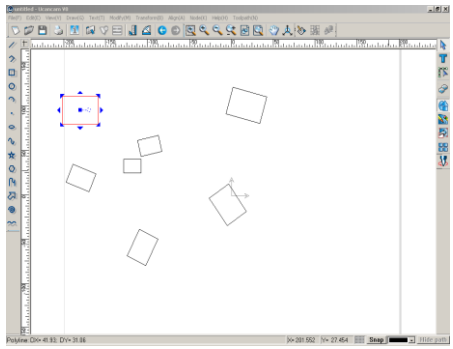


Fig. 6-46c (the effect)

6.13 Group & Ungroup

You can group several objects so that they behave as one unit. Grouped objects can be deleted, moved or transformed as a single entity. You can add objects to an existing group, and ungroup them when you want to edit then individually.

To group several objects

1 Select the objects to be grouped.

2 Click on the icon on **Modification Bar** or select **Modify->Group**.

Then the objects are grouped.

To ungroup several objects

1 Select the objects to be ungrouped.

2 select **Modify->Ungroup**.

Then the objects are ungrouped.

6.14 Block

Block is to group objects of different properties to be one object. Objects that can be blocked include graphs, tool paths, text, etc.

Click **Modify->Block** on the menu bar to block the objects. Click. **Modify->Unblock** on the menu bar to unblock the objects.

6.15 Object Color

You can change the color of the object by

1 Select the object to be edited.

2 Click on or the drag down list (the color list is also available on the right of the status bar).

3 The color selection box is shown. (Fig. 6-47)

Fig. 6-47

To choose other colors, click on **Other Color**.

7. TEXT EDITING

This chapter is devoted to a general introduction of the usage of text editing in Ucancam.

7.1 Text Input

7.1.1 Rapid Input

To improve text imputing speed, you can apply **Rapid Input**.

1 Click on the icon on **Text Editing Bar** or click **Text->Rapid Input**.

2 A dialog is displayed. (Fig. 7-1)

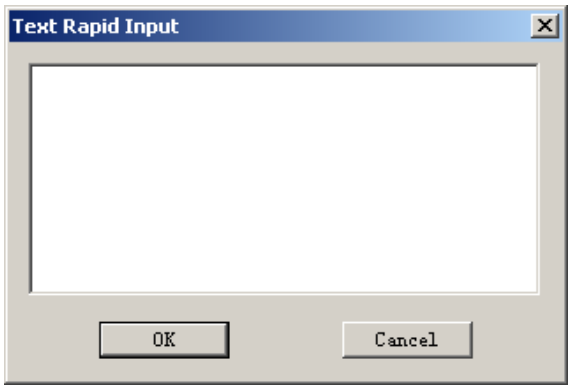


Fig. 7-1

3 Input the text, and click on .

4 The words **Start of text** are displayed in the status bar. Input the coordinate value and press **Enter** or just click in the drawing window to designate the starting position of the text, and then the text is shown in the designated place.

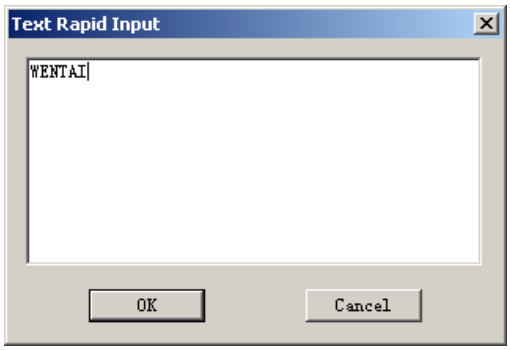


Fig. 7-2 (input the text)

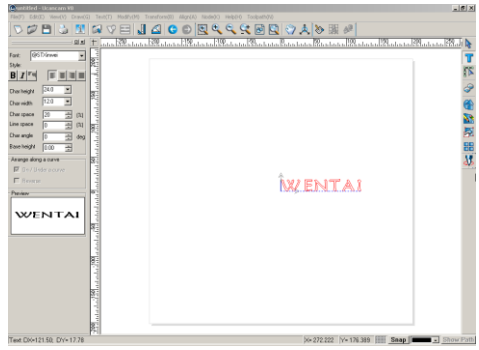


Fig. 7-3 (after inputting the start coordinate)

REMARK: You can copy the text in other software (e.g. Word) to the dialog **Rapid input** by pressing **Ctrl** + **C** and **Ctrl** + **V**.

7.1.2 Editing Input

There are three ways to enable this function.

- Click on the icon on the **Editing Tool Bar.**
- Click **Text->Edit Tools.**
- Press **Ctrl + T.**

Then the editing input dialog is displayed on the left of the screen.

Click the left mouse button in the drawing window to start text input. (Fig. 7-4)

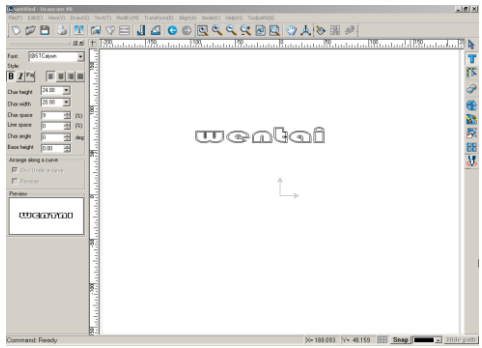


Fig. 7-4

REMARK: Properties of the text can be set either before or after input of the text.

7.2 Text Editing

7.2.1 Font Installation

You can install font which you need .method of installation: open control panel and find font then copy it to font file.

7.2.2 Font Selection

Ucancam provides you with various font types. But note all the font properties should be set after entering Editing Input mode.

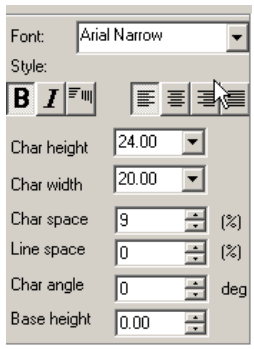


Fig. 7-5

7.2.3 Character Height & Width

1 Select the word(s) to be edited.

2 Input values in the list of **Character width** and **Character height** or select the value from the drag down list. (Fig. 7-6)

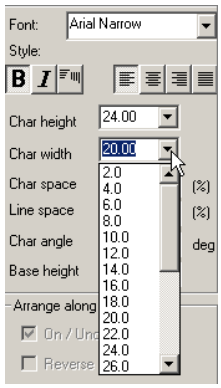


Fig. 7-6a (select char width)

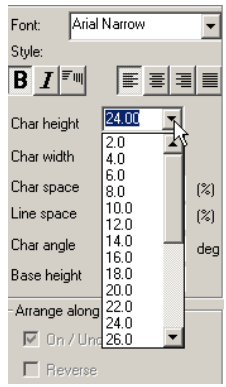


Fig. 7-6b (select char height)

REMARK: The value which has been input will be automatically remembered in the drag down lists. When inputting the value of char height, the value of char width will change in proportion automatically, but when inputting character width, the value of char height will not change. The range of the value of char width and height should be within 0 to 99999.

7.2.4 Overstriking & Incline

1 Select a text.

2 Click on the icon **B**, then the selected text will be overstriked. Click on *I*. Then the text will be inclined. (Fig. 7-7)

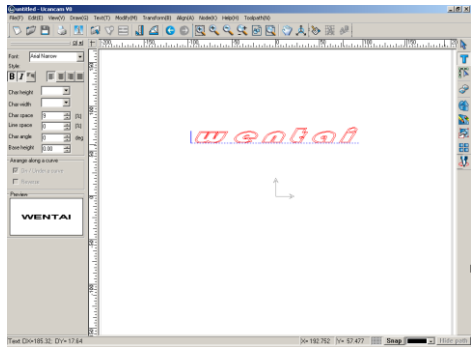


Fig. 7-7

7.2.5 Vertical Text Flow

1. Select a text.

2. Click on the icon . (Fig. 7-8)

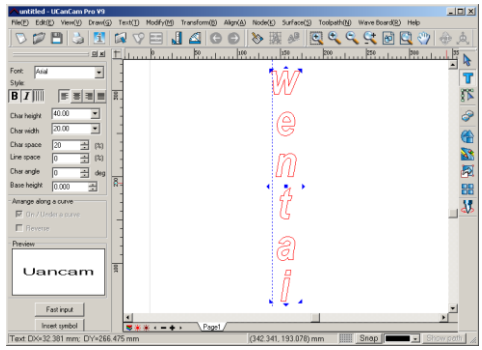


Fig. 7-8

7.2.6 The Same Height

1 Select a text.

2 Click on the icon Aa, then the selected text will change the height, keep the same height. Fig. 7-9)

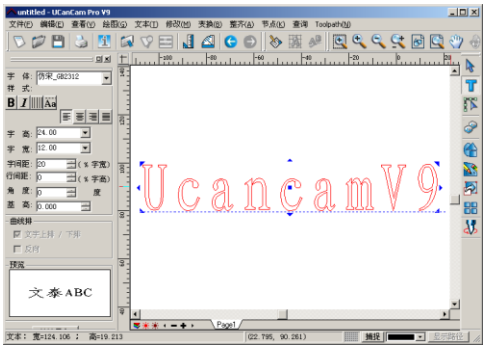


Fig. 7-9a

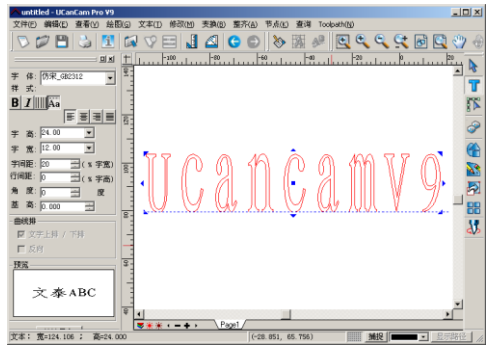


Fig. 7-9b

7.2.8 Character Space & Line Space

Character space means the distance between each two characters; line space is the distance between every two lines.

To set character space and line space

1 Select the characters.

2 Input the value in the list of **Char Space** and **Line Space** or select from the drag down list. (Fig. 7-11)

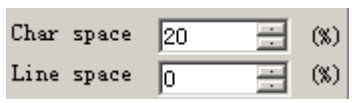
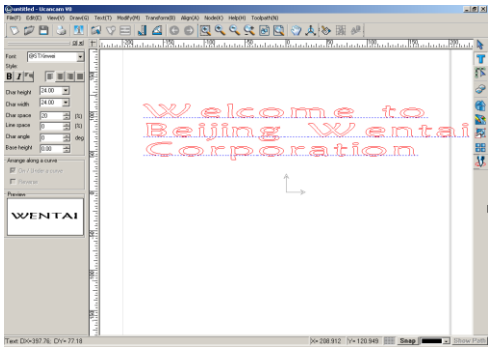


Fig. 7-10

7.2.9 Align

1 Select the words to be aligned.

2 We can see four icons: (align on left), (align on center), (align on right), and (fill). Click on one of them. The result is shown below.



F7-11a (align on left)

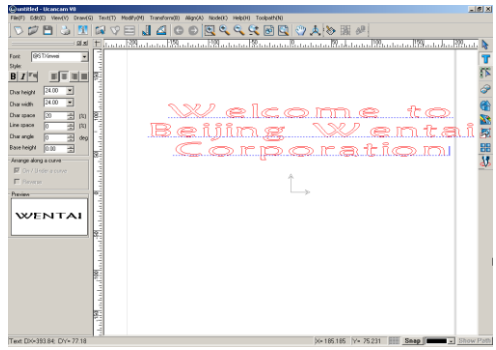


Fig. 7-11b (align on center)

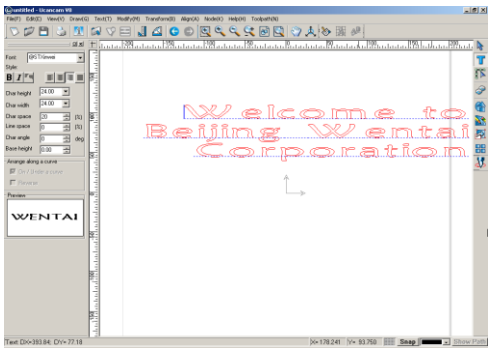


Fig. 7-11c (align on right)

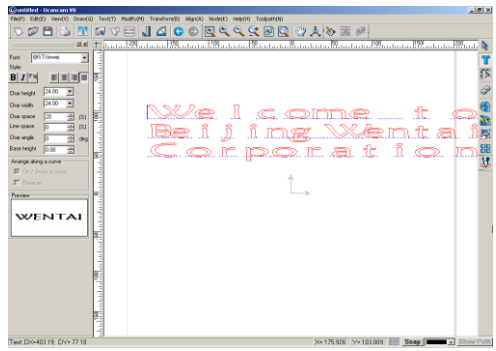


Fig. 7-11d (fill)

7.2.10 Text Rotate

● **Input the value of angle**

1 Select the text to be rotated.

2 Enter the Editing Input mode.

3 Type a value in char angle or select a value from the drag down list. (Fig. 7-12)

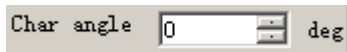


Fig. 7-12

7.2.11 Base Height

Sometimes the text is not on the same horizontal line. (e.g."2$2^{n}$) In this case, we can adjust the distance between the base line and the character by setting the parameters of baseline. Input the value in the dialog or select a value from the drag down list. (Fig. 7-13)

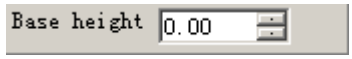


Fig. 7-13

Steps are as follows

1 Select one or more objects.

2 Type a value in the Base height list or select a value from the drag down list.

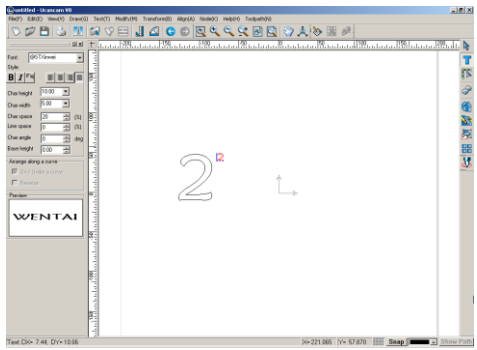


Fig. 7-14

7.3 Text Along A Curve

Text Along A Curve is to put a text on a curve. There are two ways to enable this function.

Method 1

1 Input a text, and draw a curve.

2 Select both the curve and the text.

3 Click the icon on **Text Editing Bar** or click **Text->Text along A Curve**.

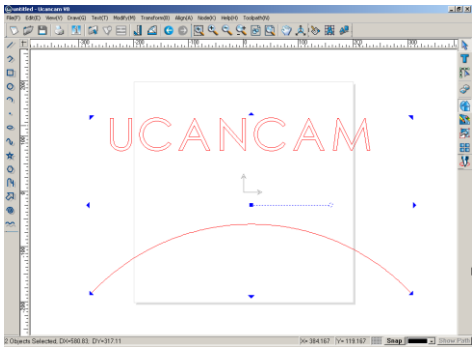


Fig. 7-15a (select the text and the curve)

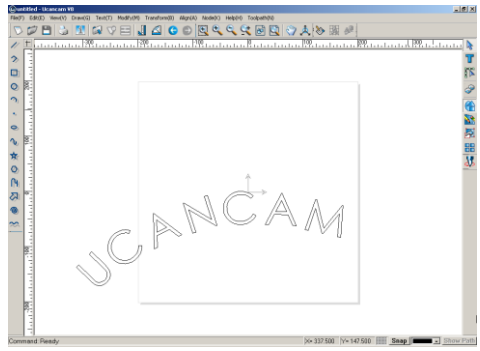


Fig. 7-15b (the text is put along the curve)

As we can see in Fig. 7-14b, the length of the text is not equal to that of the curve, so the text is not put in full length on the curve. Enter **Editing Input** mode and adjust the value in **Char Space**, the result is shown in Fig. 7-16

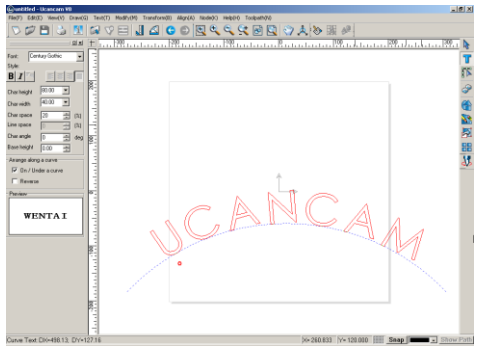


Fig. 7-16

In Fig. 7-16, we can see that there is a little red circle under the first letter **U**. Move the cursor onto the little red circle. When the cursor changes into " ", hold the left mouse button and drag it to pick the starting point of the text on the curve again. (Fig. 7-17)

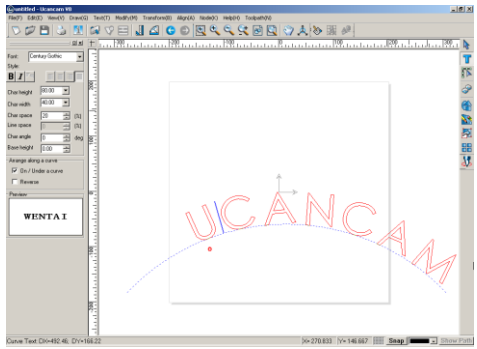


Fig. 7-17

You can also put the text under a curve or in reversed direction.

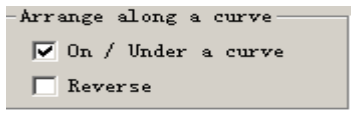


Fig. 7-18

Deselect **On/Under a curve** to put the text under the curve.

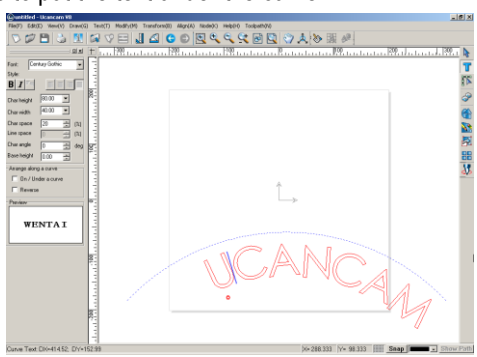


Fig. 7-19

Tick **Reverse**, and the text will be put in reverse direction. (Fig. 7-20)

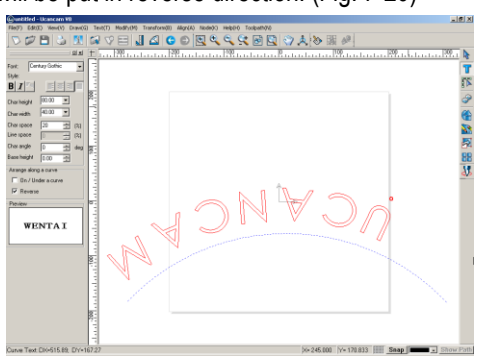


Fig. 7-20

Method 2

1 Type a text and draw a curve.

2 Enter the Editing Input mode.

3 Put the cursor onto a curve.

4 When the cursor changes into , move the cursor to pick the starting point of the text on the curve.

5 Click the left mouse button, and the glinting cursor appears on the curve.

6 You can input the text on the curve now. (Fig. 7-21)

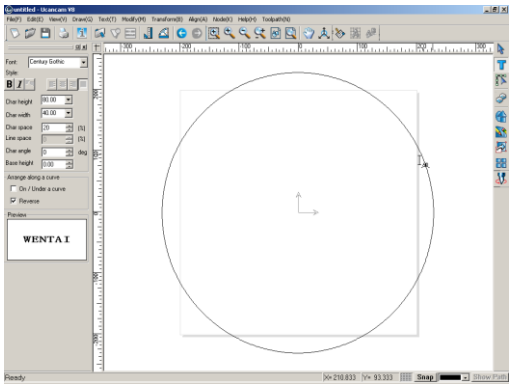


Fig. 7-21a (the cursor changes into)

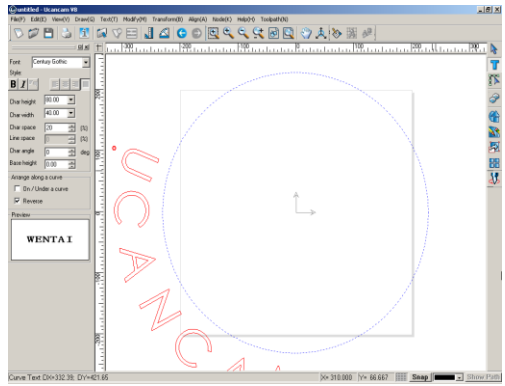


Fig. 7-21b (input the text)

After inputting the text, you can set the properties of the text with the same method as in method 1.

REMARK: The curve is not displayed in graph edit mode but only in text edit mode.

7.4 Hollow Character

This function is to make hollow characters. Follow the steps below:

1 Exit Editing Input mode

2 Select the text to be hollowed.

3 Click **Text->Hollow Characters**.

4. A dialog is displayed. (Fig. 7-22)

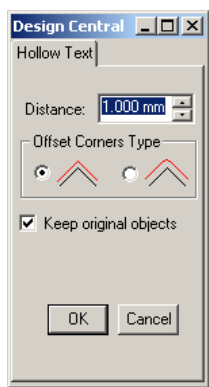


Fig. 7-22

Parameters

Offset Distance: the value by which the text is to be extended.

Offset corners type: is the shape of the corner, including **Acute angle** and **Round angle**.

Keep original objects: is to preserve the original text in the drawing window after operation.

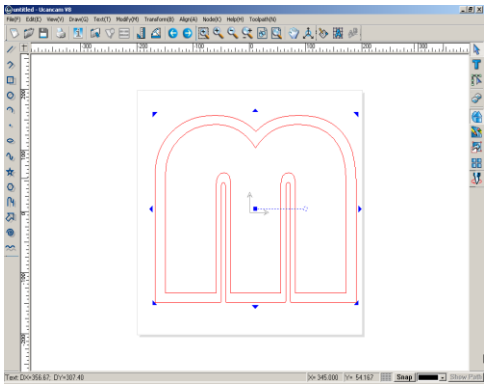


Fig. 7-23a (original)

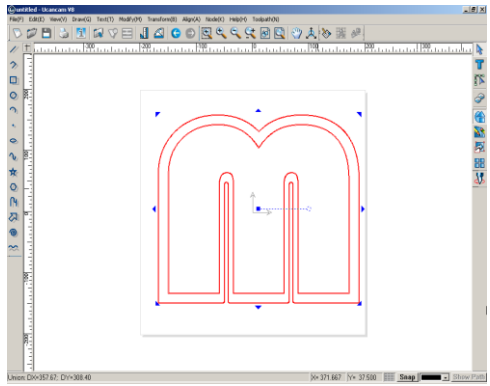


Fig. 7-23b (the effect of hollow character)

7.5 Convert To Curves

1 Exit the Editing Input mode.

2 Select the text.

3 Click on the icon on **Text Editing Bar** or click **Text->Convert to Curves**.

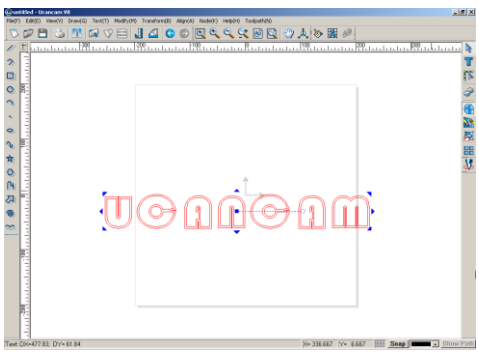


Fig. 7-24a (select the text)

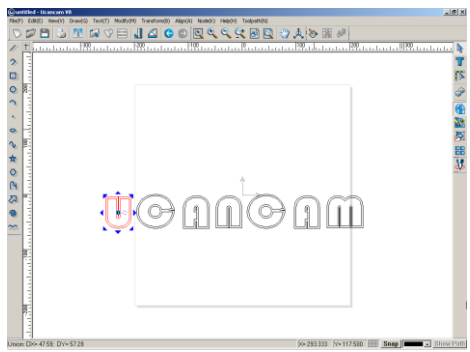


Fig. 7-24b (the text is changed into individual units)

If we group two or more text and then ungroup them, the text can be changed into individual units.

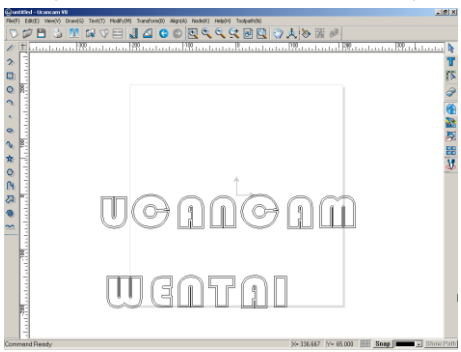


Fig. 7-24c (input two lines of texts)

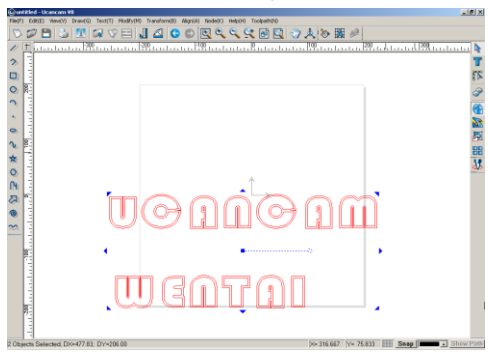


Fig. 7-24d (select the texts to group them)

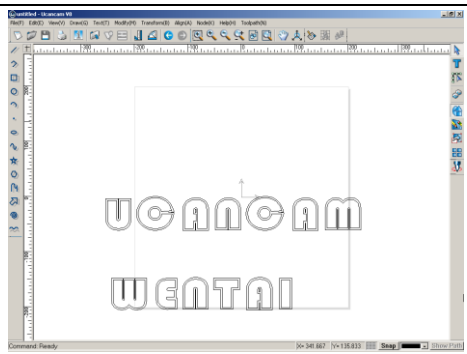


Fig. 7-24e (ungroup)

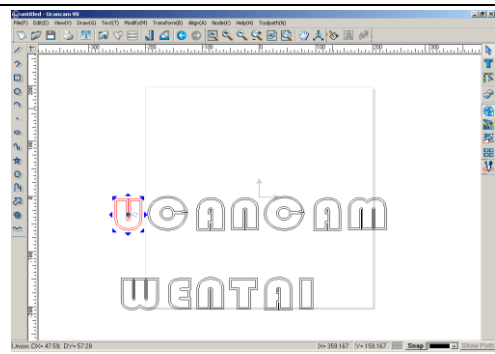


Fig. 7-24f (the text is changed into individual units)

If a text and a graph are grouped and then ungrouped, the text can also be changed into individual units. (Fig. 7-25)

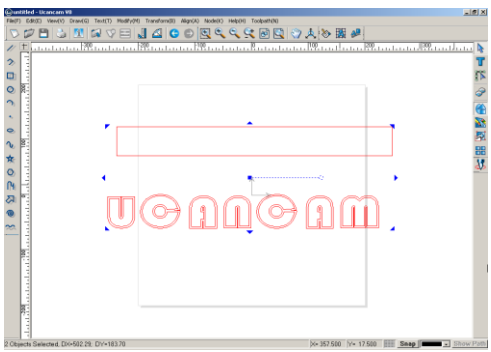


Fig. 7-25a (select text and graph)

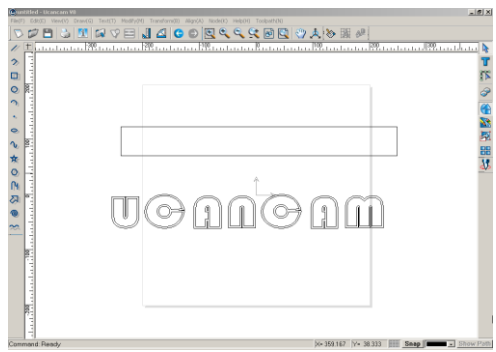


Fig. 7-25b (ungroup)

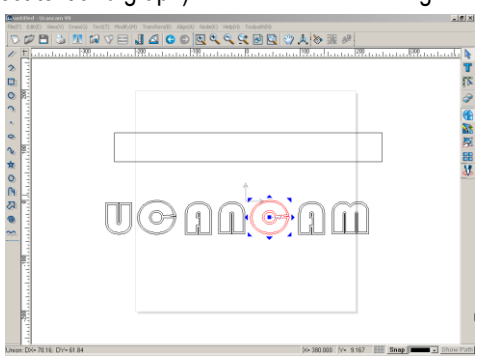


Fig. 7-25c (the text is changed into individual units)

REMARK: The text which has been changed into graphs should not be adjusted using text editing tools.

7.6 Serial Number Text

When we are making cards, we need to change the serial numbers on the card. With **Serial Number Text** function, this is made easier.

1 Select **Text->Serial Number Text**

2 A dialog is displayed. (Fig. 7-26)

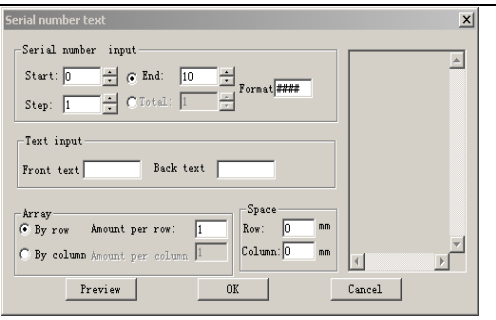


Fig. 7-26

Parameters

● Serial number input

Start: is the value of the first serial number.

End: is the value of the last serial number.

Step: is the value gap between each two adjacent serial numbers.

Total: is the total amount of the serial numbers

Format: is the digit of the serial numbers

● Text input

Front text: is the text before the serial numbers.

Back text: is the text after the serial numbers.

● Array

Amount per row: is the amount of serial number text in each row.

Amount per column: is the amount of serial number text in each column.

Row space: is the space between each row.

Column space: is the space between each column.

Click on **Preview** to preview the effect.

Click on **OK**, and input the start coordinate of the text in the status bar or simply click the left mouse button in the drawing window to fix the position of the first serial number text.

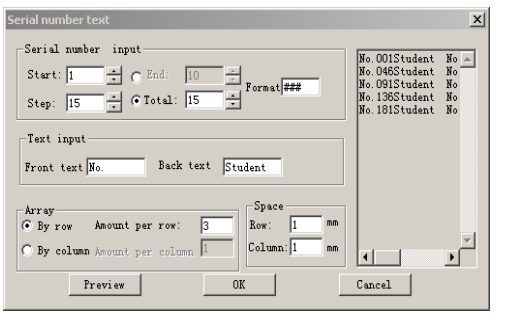


Fig. 7-27a (input the value)

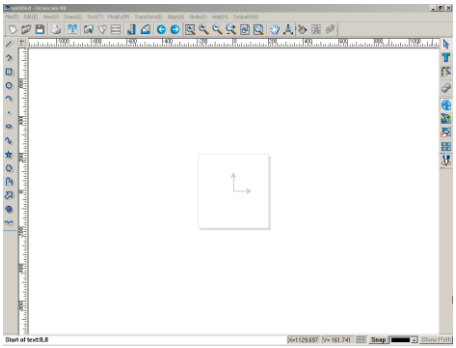


Fig. 7-26b (input the coordinate)

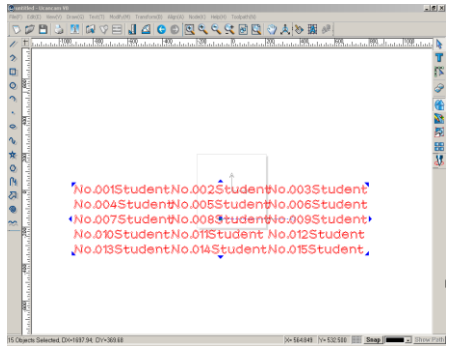


Fig. 7-27c (the effect)

7.7 Text Symbol

Variuos symbols and special characters can be inserted into text with Text Symbol in Text Tool.

It include: Latin, Digital, Unit, Punctuation, Math, Special Character, Greece, Arrow, Table.

1.Click Text->Insert Text Symbol in the menu bar, and a dialog appears on the left.

2.Select on a symbol, click <Insert> button or double click a symbol, get the character in the drawing window.

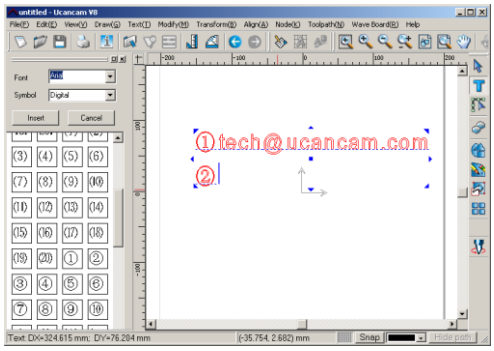


Fig. 7-28

7.8 Replace

You can replace a letter with another one with Replace. Follow the steps below.

1 Choose the letters.

2. Click **Text->Replace** in the menu bar, and a dialogue box appears. (Fig. 7-29)

3. Enter the letter or some sequence letters to be replaced in **FIND WHAT**; enter the letter or letters in **REPLACE WITH**. And click on **OK**.

Then the letters are replaced.

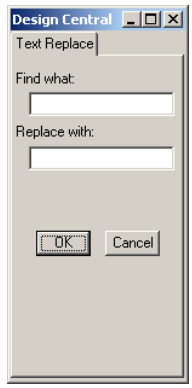


Fig. 7-29

7.9 Single Stroke Text

Follow the steps below.

1 Choose a letter or several letters

2 Click **Text->Single Stroke** in the menu bar

3 select minimum branch length and press **ok**, and then single stroke is created.

4 Press **Cancel** to cancel operation.

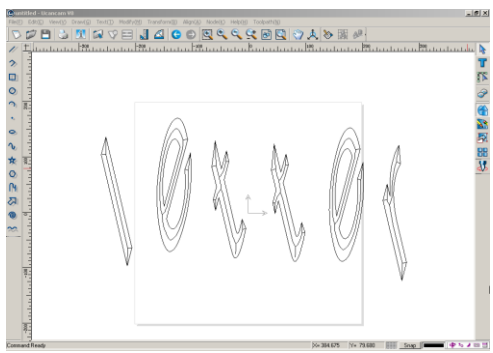


Fig. 7-30

7.10 Text In A Closed Shape

You can input text in a closed shape.

1 Draw a closed shape

2. Click to enter Text mode

3. Move the cursor to the shape. When the cursor changes to, click the left mouse button. And then you can type in text in the closed shape.

8. NODE EDIT

With Ucancam, you can draw lines, arcs, circles, ellipses, curves, etc. The shape of a curve is determined by four points: two end points and two controlling points. (Fig. 8-1) The shape of a curve can be changed by changing the position of the end points and the controlling points.

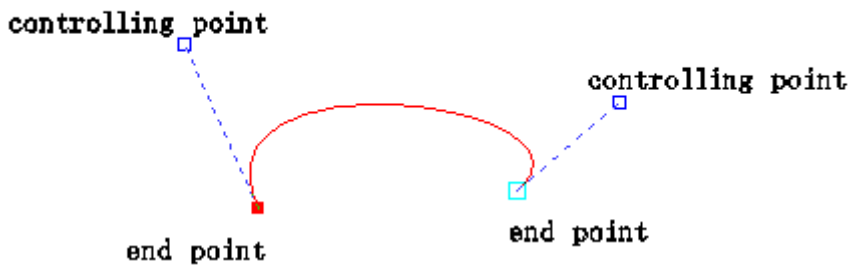


Fig. 8-1

Functions in node editing include: **Add, Delete, Disconnect, Connect, Close, Convert to line, Convert to curve, Smooth, Symmetry, Node align, Start point, Auto remove points, Fillet, Chamfer,** and **Vertical.**

8.1 Node Selection And Move

There are two ways to select a node.

- To select one node, click the node or click the right mouse button to display the context menu in node editing mode.
- To select several nodes, drag the mouse to form a box around the nodes, or click the nodes one after another while pressing the **Shift** key, and end the operation by releasing the **Shift** key.

To move a node

1. Select the node
2. Click the left mouse button on the node. Hold and drag the mouse to move the node. (A node can be moved horizontally or vertically by pressing the **Ctrl** key at the same time.)

8.2 Add & Delete A Node

To add a node

1 Enter the node editing mode.

2 Click on the location where you are going to put the new node.

3 A black dot appears in this position.

4 Click the icon on **Node Editing Bar** or click **Node**->**Add**.

5 A new node is added in the selected position.

You can add a node by double clicking the left mouse button. (Fig. 8-2, Fig. 8-3)

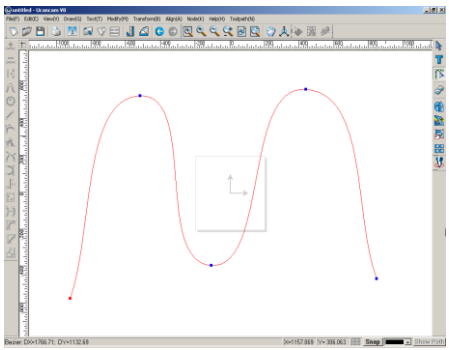


Fig. 8-2

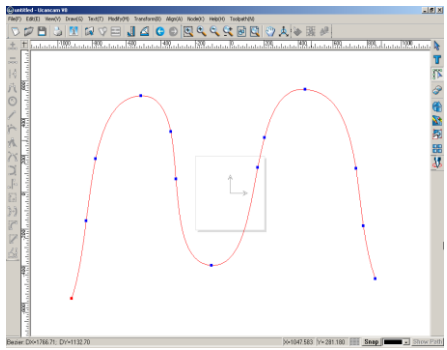


Fig. 8-3

To delete a node

1 Select a node.

2 Click on the icon on **Node Editing Bar** or click **Node**->**Delete**.

Nodes can also be deleted by double clicking the left mouse button. (Fig. 8-4 is the effect after deleting two nodes from Fig. 8-2.)

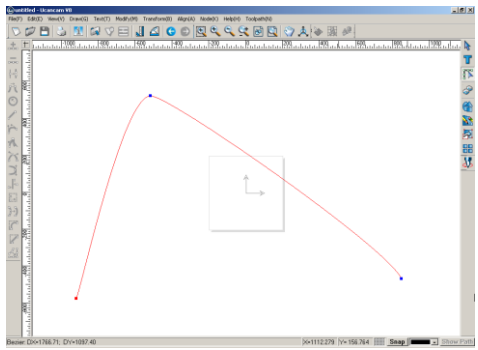


Fig. 8-4

To add or delete several nodes at the same time

1 Select several nodes.

2 Click on the icon on **Node Editing Bar** or click **Node**->**Delete**.

REMARK: Nodes of circles and ellipses can not be deleted.

8.3 Cusping & Smooth

Cusp and smooth are the two types of relative positions between nodes and their controlling points. When one of the two controlling points is moved, the other one is moved accordingly to make the curve smooth. A node and its two controlling points are not put on the same line by applying **Cusping** function. When moving one of the two controlling point, the other one is not moved, thus making the curve acute. **Smooth** and **Cusping** are only applied to Bezier.

To cusp a node

1 Enter node editing mode

2 Select the node to be edited.

3 Click on the icon on the **Node Editing Bar** or click **Node**->**Cusping**.

4 Move the controlling points by dragging the mouse. (Fig. 8-5)

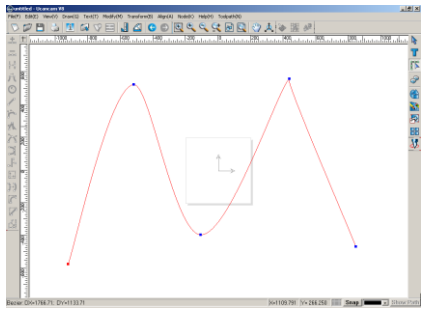


Fig. 8-5

To smooth a node

1 Enter node editing mode

2 Select the node.

3 Click on the icon on **Node Editing Bar** or click **Node**->**Smooth**.

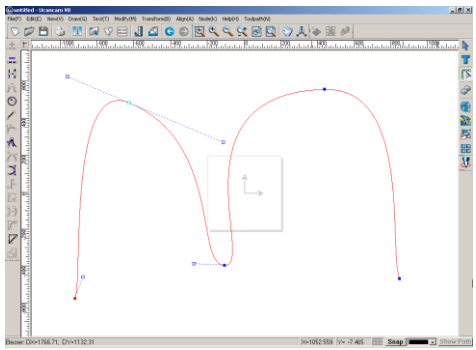


Fig. 8-6

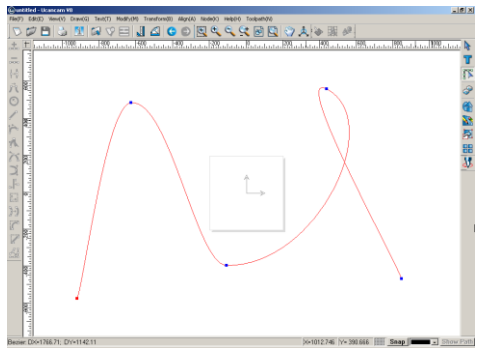


Fig. 8-7

You can change the shape of the curve by changing the position of the controlling points. (Fig. 8-7)

REMARK: **Smooth** function should only be applied to acute nodes, and **Cusping** operation is only valid to smooth nodes.

8.4 Symmetry

1. Enter node editing mode.
2. Select the nodes.
3. Click on the icon on the **Node Editing Bar** or click **Node**->**Symmetry**.
4. Move the controlling points by dragging the mouse.

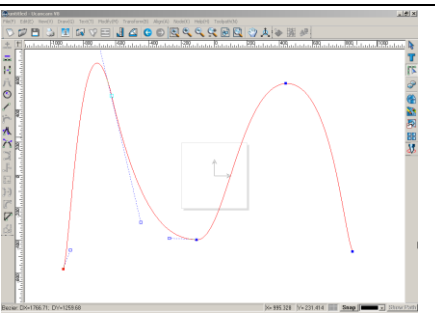


Fig. 8-8

8.5 Align

Align is to align the selected nodes horizontally or vertically.

1 Enter node editing mode

2 Select the nodes.

3 Click on the icon on **Node Editing Bar**.

4 A dialog in Fig. 8-9 is shown.

5 Select the way you want to align the nodes, and then click **OK**.

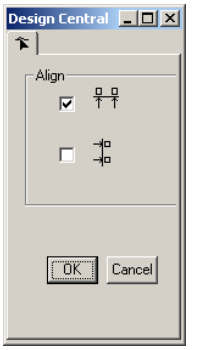


Fig. 8-9

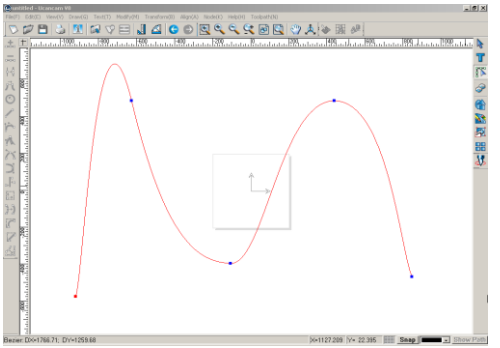


Fig. 8-10 (horizontal align)

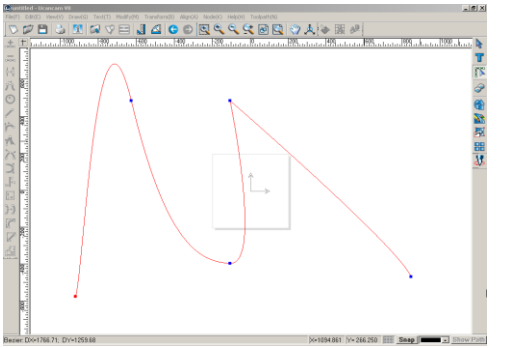


Fig. 8-11 (vertical align)

REMARK: The number of nodes to be aligned must be two or above; otherwise the operation is invalid.

8.6 Convert To Line & Convert To Curve

Convert to line

1 Enter Node Editing mode by clicking on the right of the screen or by clicking **Node->Node Tools** on the menu bar.

2 Click on the shape to display its nodes.

3 Select a node.

4 Click on the icon on the **Node Editing Bar** or click **Node->Convert to line**.

Then the curve between the selected node and the node right after it is converted to a line.

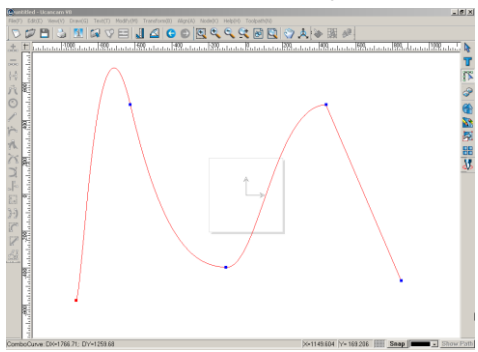


Fig. 8-12

REMARK: When the selected node is the end point of the curve, the curve between the end point and the node right before it is changed into a line.

Convert to curve

1 Enter Node Edit mode

2 Select the nodes to be edited.

3 Click on the shortcut icon on the **Node Editing Bar** or click **Node->Convert to curve**.

8.7 Disconnect & Connect

To disconnect a node

1 Select a node.

2 Click on the icon on **Node Editing Bar** or click **Node->Disconnect**.

3 Then the node is disconnected.

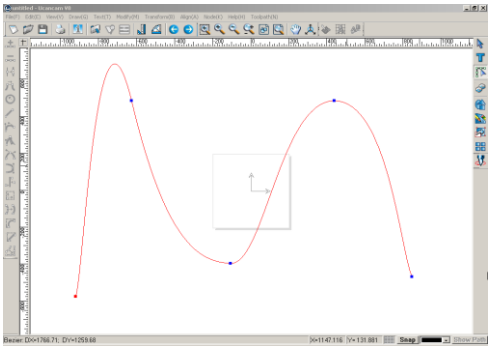


Fig. 8-13a (original)

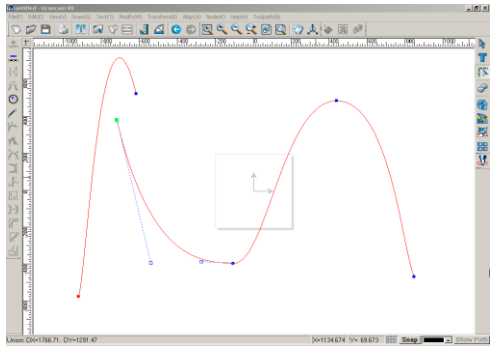


Fig. 8-13b (after disconnecting the node)

To connect nodes

1 Select the nodes to be connected.

2 Click on the icon on the **Node Editing Bar** or click **Node->Connect**.

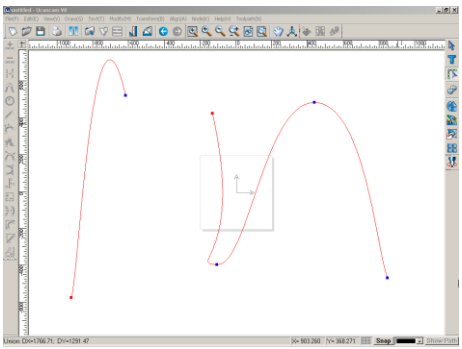


Fig. 8-14a (original)

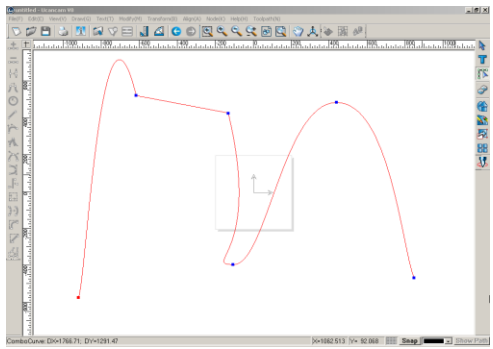


Fig. 8-14b (after being connected)

REMARK: The **connect** function is only valid when connecting two starting points, or two end points or one starting point and one end point.

8.8 Close

Close is to connect the starting point and the end point of a curve to change the curve into a close one.

1 Select the curve to be closed by clicking on one of its nodes.

2 Click on the icon on **Node Editing Bar**.

3 Select **Node ->Close**.

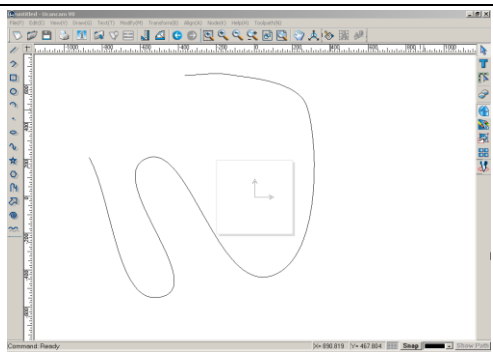


Fig. 8-15a (original)

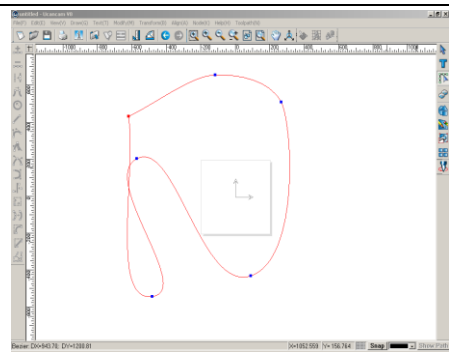


Fig. 8-15b (after being closed)

8.9 Start Point

1. Select a node.

2. Click on the icon on the **Node Editing Bar** or click **Node->Start point**.

REMARK: This function is valid only when the object to be edited is a close graph.

8.10 Auto Remove Points

With **Auto Remove Points** function, the number of nodes in a graph can be reduced without changing the shape of the graph, thus making node editing easier.

1 Select the nodes to be removed.

2 Click on the icon on **Node Editing Bar** or c

lick **Node->Auto Remove Points**. The nodes are removed from the graph.

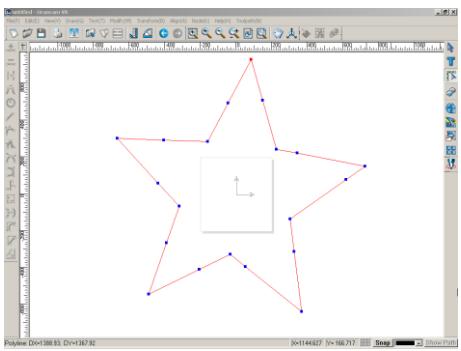


Fig. 8-16 (original)

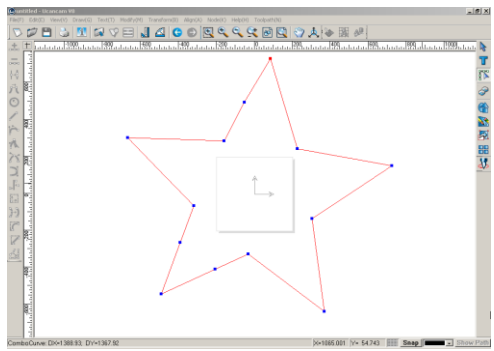


Fig. 8-17 (after removing some points)

You can apply this operation to either all the nodes or only some of the nodes.

8.11 Fillet

1. Select a node.

2. Click on the icon on **Node Editing Bar** or click **Node->Fillet**.

3. A dialog (Fig. 8-18) is displayed.

4. Input the value of radius (Radius is the radius of the arc.) and click on **OK**.

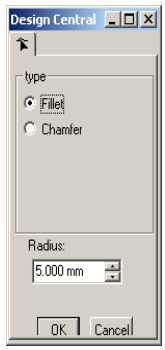


Fig. 8-18

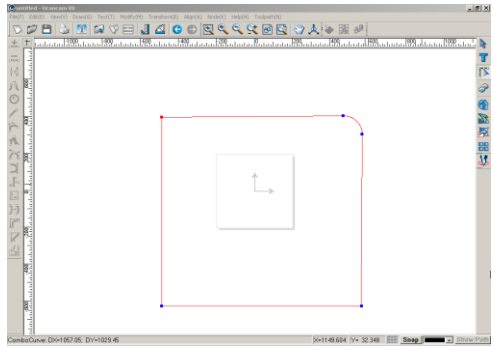


Fig. 8-19b (the effect)

REMARK: This function is only valid when editing acute angles.

8.12 Vertical

With this function, an acute angle can be changed into a right angle.

1 Select the node to be edited.

2 Click on the icon on the **Node Editing Bar** or click **Node->Vertical**.

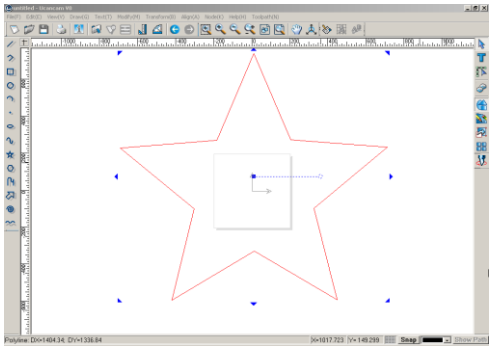


Fig. 8-20a (original)

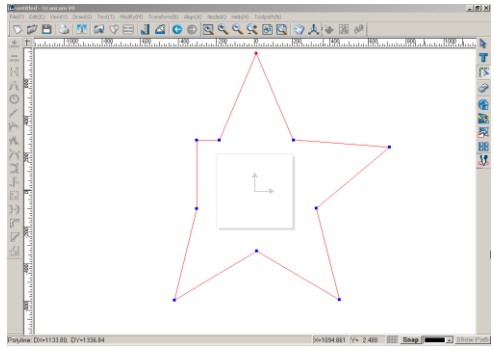


Fig. 8-20b (the effect)

8.13 Node Position

You can give an accurate position to the node which you selected .select a node, change it's X-coordinate and Y-coordinate at **Design Central**. Fig 8-23

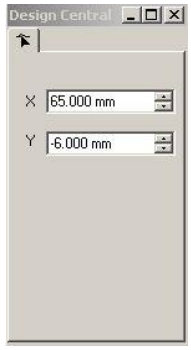


Fig 8-23

9. ADDITIONAL OPERATIONS

9.1 Image Processing

The system provides many image processing functions such as image scanning, image tracing, image stripping, adjusting brightness, adjusting contrast, and converting into grayscale image.

9.1.1 Image Scanning

Image scanning function can help you import images through scanner. Make sure that your computer and scanner are connected before scanning. Put the object in the scanner. Click **File->Select Scanner** in the menu bar, and then the following dialog is displayed.

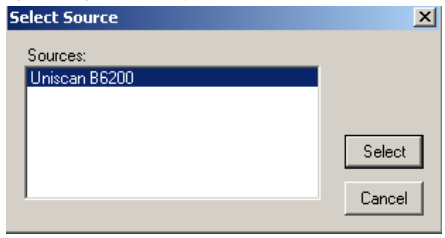


Fig. 9-1

The names of the scanners are displayed in the dialog, select one and click on **select**. Then click **File->Image Scan** in the menu bar, and a dialog is displayed. Select the object to be scanned and start scanning. (Fig.9-2)

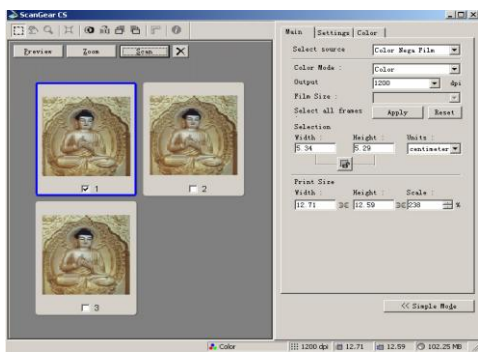


Fig. 9-2

9.1.2 Adjust Brightness

Select the image to be edited, then click **File->Image processing->Adjust brightness** in the menu bar and a dialog is displayed. Drag the slider in the dialog to adjust image brightness value.

9.1.3 Adjust Contrast

Select an image in the drawing window, then click **File->Image Processing->Adjust Contrast** in the menu bar, and a dialog is displayed. Drag the slider in the dialog to adjust the contrast of the image.

9.1.4 Convert Into Grayscale Image

Grayscale image is composed of pixel of binary digit, with 256 kinds of gray colors.

Select an image in the drawing window, then click **File->Image Processing->Convert into Grayscale Image** in the menu bar, and a multicolor image is changed into a grayscale image. (Fig. 9-3 and Fig. 9-4)

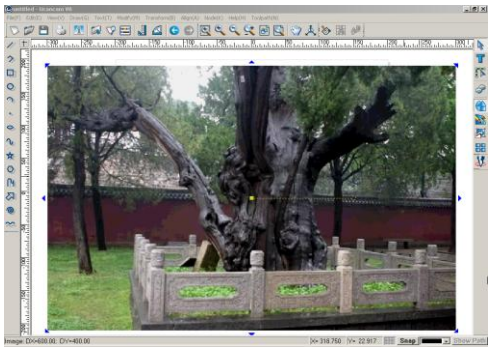


Fig. 9-3 (multicolor image)

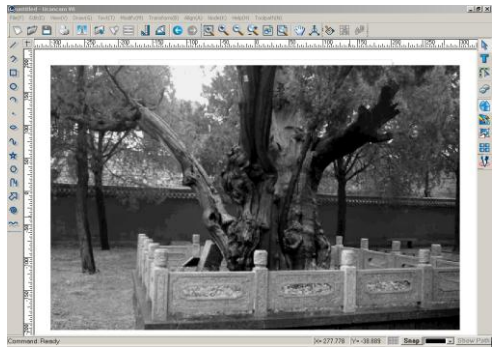


Fig. 9-4 (grayscale image)

9.1.5 Image Tracing

Image tracing is a very important command and plays an important part in image engraving. It refers to getting the parameters of the contour of the image.

Select an image, and click on the shortcut icon on **Standard Bar** or click **File->Image Processing->Image Tracing** in the menu bar, then the following dialog is displayed. (Fig. 9-5)

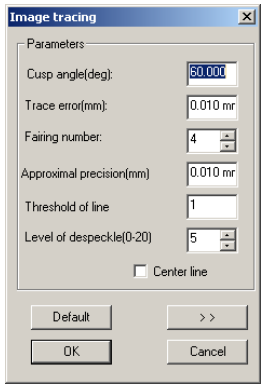


Fig. 9-5

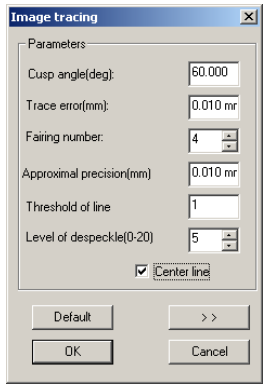


Fig. 9-6

Parameters

Cusp angle: When tracing an image, the contour contains some cusp angles, and if we set the value at 60, then the angles above 60 degrees will be smoothed into curves, and those below 60 degrees will not be changed.

Trace error: The smaller the value of trace error is, the more accurate the contour is, and the longer the time of calculation is.

Fairing number: The bigger the value is, the better the effect is.

Approximal precision: The value is to set approximate image borders.

Threshold of line: If the bending level of the curve is less than this value, then the curve will be replaced by a line.

Level of despeckle: When importing images, there are probably unneeded spots left on the image.

In order to remove these unwanted spots, we can set the level of despeckle to make the image clearer.

Center line: is to draw the center line of the contour of the graph.

Default: After changing the parameters, if you want to resume the default value, you should click on **Default**, and then the value returns to the default value.

Preview: Click on >> to observe the result of the image tracing process.

The following is an example.

1. Click **File->Import** in the menu bar to import a file in BMP format. (Fig. 9-7)

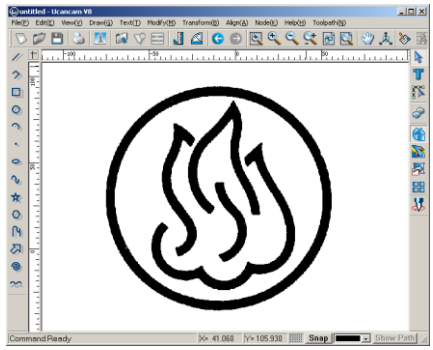


Fig. 9-7

2. Select the image, and click on the shortcut icon in **Standard Bar** or click **File->Image Processing->Image Tracing** in the menu bar. Then a dialog is displayed. (Fig. 9-9)

3. Keep the default value, and click on **OK**. Then the dialog **Image Tracing** is displayed. (Fig. 9-10)

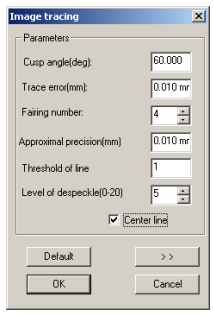


Fig. 9-9

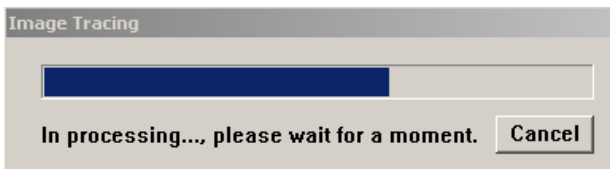


Fig. 9-10

4. Wait for a moment, and then the effect is shown. (Fig. 9-11)

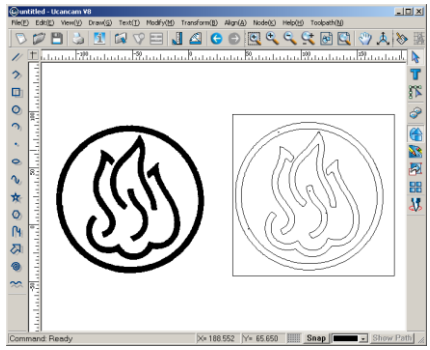


Fig. 9-11

5. The image is changed into vector graph after being processed, and you can now edit any part of it. When choosing the center line, the effect is shown below. (Fig. 9-12)

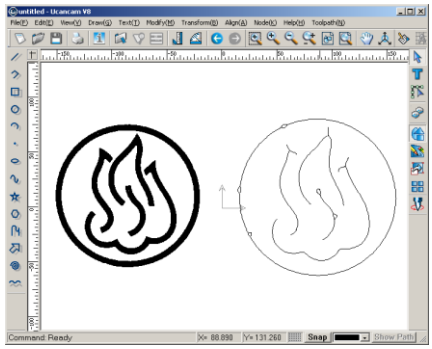


Fig. 9-12

9.1.6 Image Stripping

This is to display an image in stripe form, and the stripped image can be used in engraving. See the following example.

1 Import an image and click on the shortcut icon on **Standard Bar** or select menu **File->Image Processing->Image stripping** in the menu bar. Then the following dialog is displayed. (Fig. 9-13)

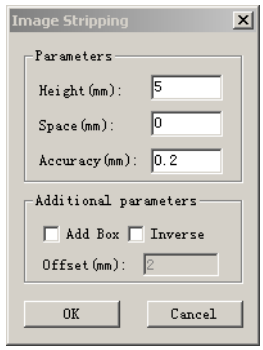


Fig. 9-13

Parameters

Height: the height of every strip of the image.

Space: the space between every two stripes.

Accuracy: the higher the value is, the more accurate the image is.

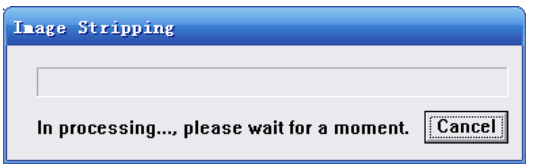
Additional parameters**:**

Add box: A box is added around the processed image if this function is started.

Inverse: The inversed image will be processed.

Offset: is the distance between the sides of the box and the edge of the image.

2 Keep the default value, and click on **OK**. Then the dialog **Image Stripping** dialog is displayed. (Fig. 9-14)



3 Wait for a moment, and then the effect is shown. (Fig. 9-15)

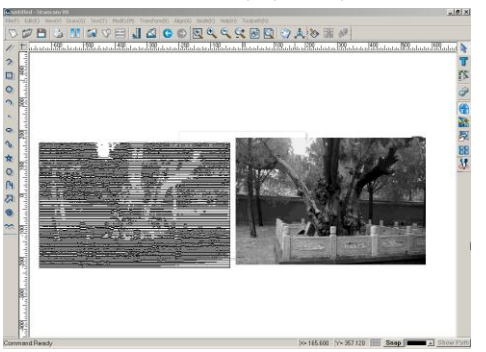


Fig. 9-15

9.1.7 Threshold

Import an image, and then click on **File->Image Processing->Threshold** in the menu bar.

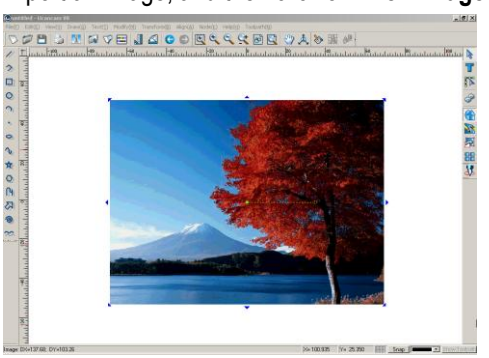


Fig. 9-16 (Before Threshold)

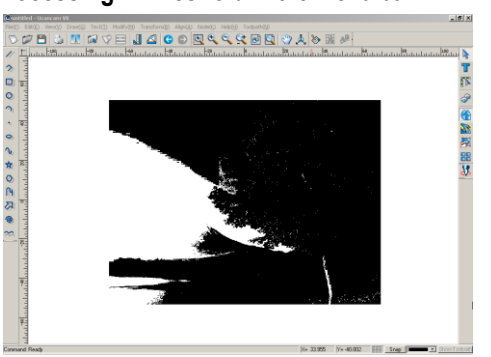


Fig. 9-17 (After Threshold)

9.1.8 Despeckle

You can clean out spots on the images with Despeckle.

Select the image, and then click on **File->Image Processing->Despeckle** in the menu bar.

9.1.9 Invert

You can invert the color of the image by clicking **File->Image Processing->Invert** in the menu bar.

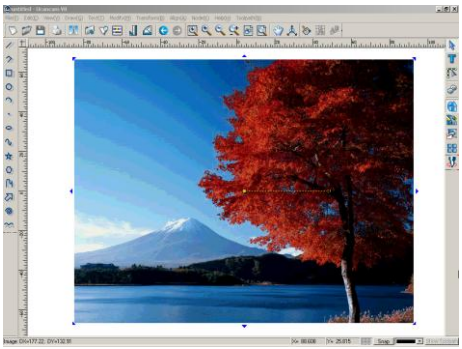


Fig. 9-18 (Before inverting color)

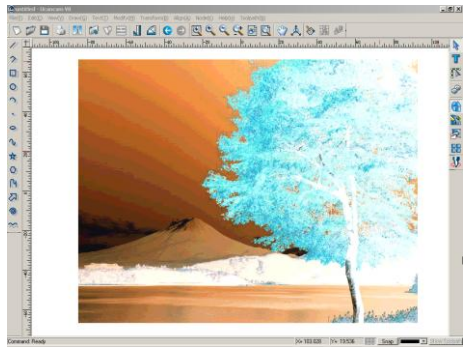


Fig. 9-19 (After Inverting)

9.1.10 Image Undo

You can cancel actions by clicking **File->Image Processing->Image Undo** in the menu bar .so that you need not to import file again.

9.2 Context Menu

We have mentioned this function in the chapters above, and now we are going to make a summary of it.

There are four types of functions regarding context menu: selection, node edit, text edit and 3D view.

Selection: The functions in selection include text edit, node edit, group, ungroup, filled display, delete, hide, lock/unlock, and object properties. When no objects are selected, the context menu displayed is shown in Fig. 9-20; when an object or more are selected, the context menu displayed is shown in Fig. 9-21. The last two operations are automatically memorized by the system.

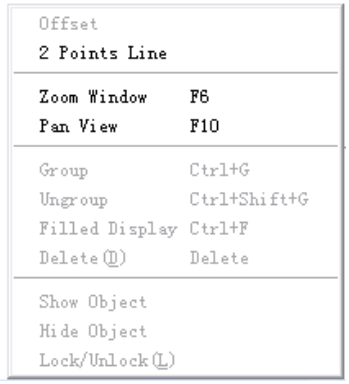


Fig. 9-20

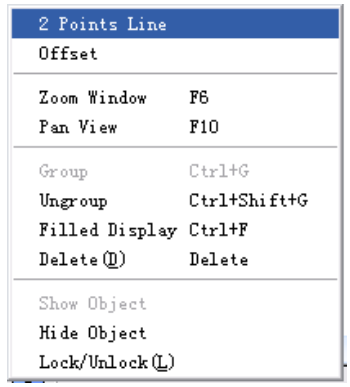


Fig. 9-21

Node Edit: The functions in node edit context menu include add (a node), delete (a node), break, join, close, convert to line, convert to curve, cusping, smooth, symnerty, align, start point, auto remove points, fillet, vertical.

Click the right mouse button after selecting the curve. Select **Node tools** command in the context

menu, and then pick the nodes to be edited, and finally click the right mouse button. Then the functions mentioned above in node editing are displayed. (Fig. 9-23)

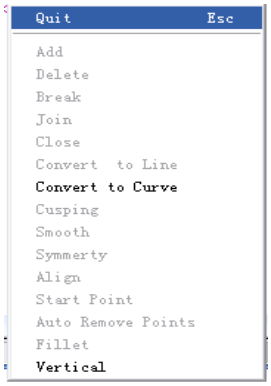


Fig. 9-23

Text Edit: The functions in text edit context menu include rapid input, serial number text, and filled display. (Fig. 9-24)

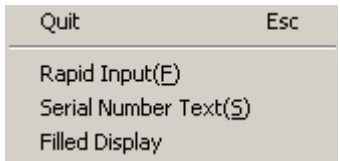


Fig. 9-24

REMARK: These functions can be enabled by clicking shortcut keys.

9.3 Layer Edit

In UCancam, you can create shapes on different layers. You can add or delete layers so to perform operations on many objects at the same time, while none of the operations interfere with each other.

The functions of the layers are as below.

1 You can hide or show the layer as you desire.

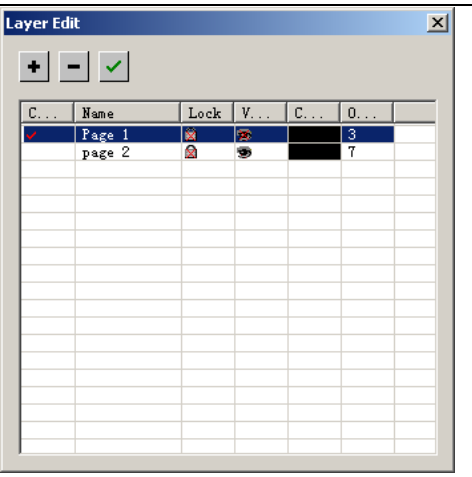
2 You can do modifications on shapes in one layer, while the shapes in other layers are not modified.

3 You can set the color to be the same in one layer, and make shapes without the need to change the color.

4 You can name one layer so that you can find the layer easily when you need.

Click **View->Layer Bar** on the menu bar, you can show or hide layer edit tool bar.

Layer Edit Tool Bar



LAYER EDIT DIALOG

10. TOOLPATH

Engraving is to carve characters or graphs on such materials as two-color board, metal, wood, and stone. CNC machine controls the motion of X, Y and Z axis under the instruction of the computer, and drives high-speed tool or laser gun to move on the material, achieving the desired result.

After designing an artwork, the artwork's tool paths are calculated by ToolPath functions in Ucancam. The data of the tool path is then sent to the control box for machining.

Various types of machining are provided by Ucancam, including profile machining, area clearance, 3D engraving, midline machining, drilling, inlay machining, prism machining, intelligent machining, embossing machining, image dot machining, image relief machining, etc.

10.1 General Knowledge About Tools

Proper tools should be chosen when machining different materials with various rigidities in order to achieve the desired result and not to break tools. You can select the tools in the tool library.

Click on the shortcut icon on **Tool Path Bar** or click **Toolpath->Tool management** on the menu bar and the following dialog is displayed. (Fig. 10-1)

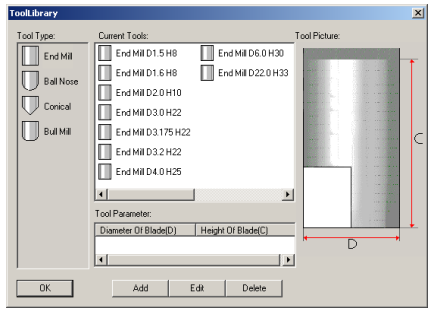


Fig. 10-1

Tools commonly used in Ucancam include end mill, ball nose, bull mill and conical. New tools can be added and existing tools can be deleted or edited in the tool library.

10.1.1 End Mill

Parameters of end mill include diameter of blade (D) and height of blade (H).

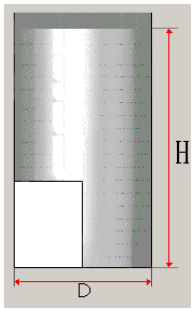


Fig. 10-2 (End mill)

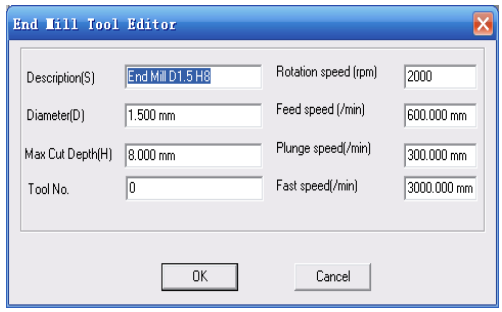


Fig. 10-3 (tool edit)

10.1.2 Ball Nose

The parameters of ball nose include diameter of blade (D) and height of blade (H).

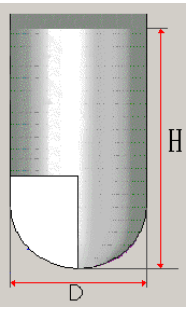


Fig. 10-4 (Ball nose)

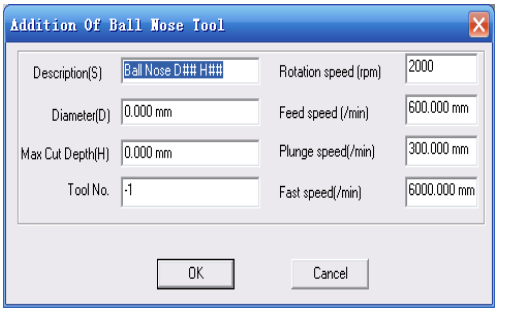


Fig. 10-5

10.1.3 Conical

Conical parameters include: diameter of handle (D1), diameter of blade (D2), height of blade (H) and angle (A) (half angle) (Fig. 10-6)

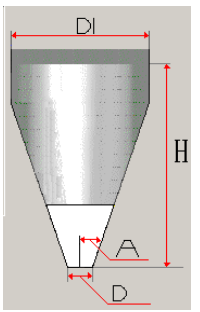


Fig. 10-6

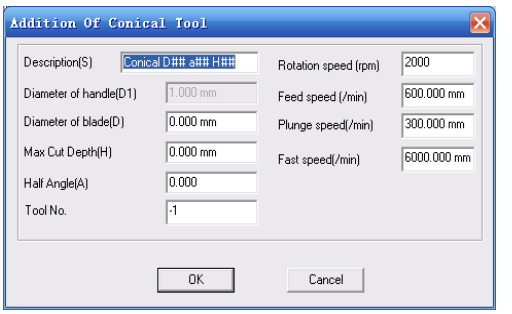


Fig. 10-6

10.1.4 Bull Mill

Parameters of Bull Mill include: diameter of blade, height of blade and Corner radius. It always is used on rough mill and area clearance. Fig 10-7

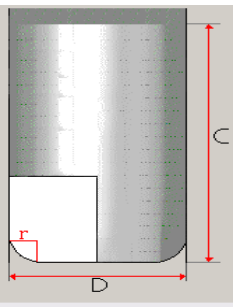


Fig 10-7

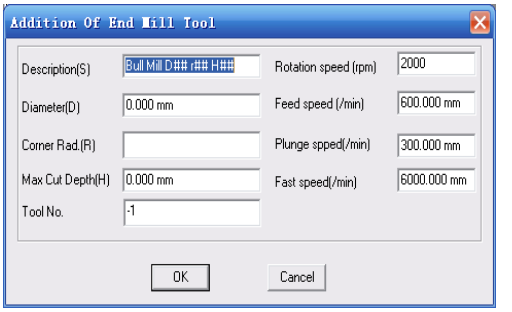


Fig 10-7

10.1.5 Tool Editing

To add a tool

1. Select **Ball Nose** from **Tool Type** (The selected tool is in blue). (Fig. 10-8)
2. Then click **Add**.
3. A dialog is shown for you to set the parameters of the new tool. (Fig. 10-9)
4. Input the parameters of the tool in the dialog and click on OK.

Then the newly added tool is displayed in the tool library. (Fig. 10-10)

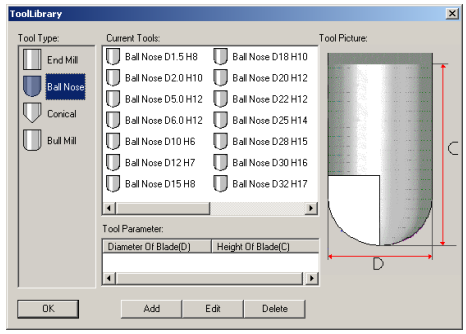


Fig. 10-8

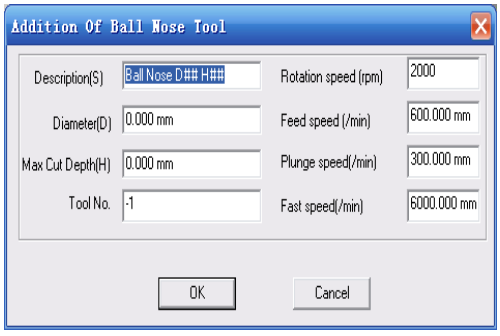


Fig. 10-9

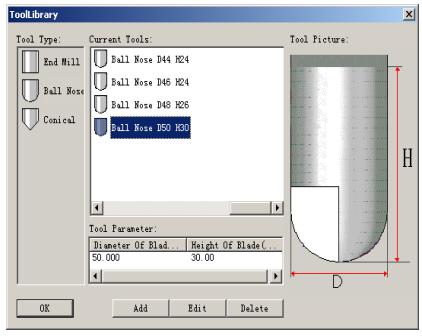


Fig. 10-10

To edit a tool

1. Select a tool in the **Current Tools** list.
2. Click on **Edit** button and a dialog **Tool Editor** is displayed.
3. Set the parameters and click on **OK**.

To delete a tool

This function is rarely used, but when you need to delete a tool from **Tool Library**, you should select a tool in **Current Tools** list and click on **Delete** button in the **Tool Library** dialog. Then the tool is deleted from the tool library.

After introduction of the tools, we can start work now. Machining can be classified into profile machining, area clearance, 3D engraving, midline machining, drilling, insert and inlay machining, prism machining, intelligent machining, embossing machining, image dot machining, image relief machining, etc

10.2 Profile Machining

Profile machining can be classified into **On**, **Outside** and **Inside** according to relationships between the tool center axis and the drawing.

On: The tool center axis is along the original drawing.

Outside: Cut along the outer contour of the drawing.

Inside: Cut along the inner contour of the drawing.

10.2.1 Parameters In Profile Machining

Click the icon on the **Tool Path Bar** or select **ToolPath->Profile machining** on the menu bar. The **Profile machining** dialog is displayed. (Fig.10-11) you can set machining parameters in the dialog.

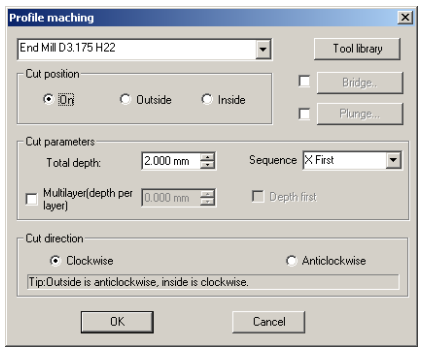
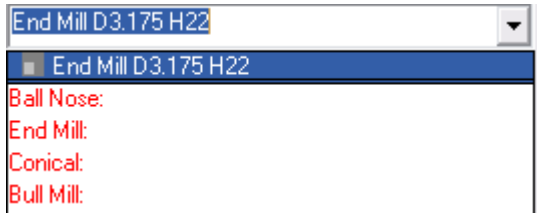


Fig. 10-11

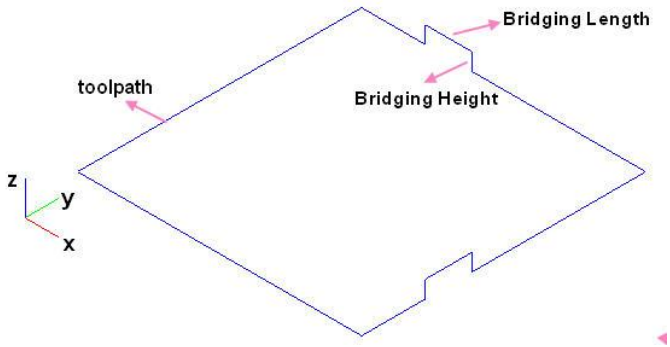
Parameters

Tool library: You can choose a tool from the drop-down list of tool library or press **Tool Library** button to choose one from tool library dialog.



Cut position: on, outside and inside.

Bridge: In order to prevent the machined object from moving which may cause objects to be destroyed or machining errors, the machined object had better not be completely separated from the material before the machining is finished. After machining, the object can be separated from the material by hand. (Fig.10-12)



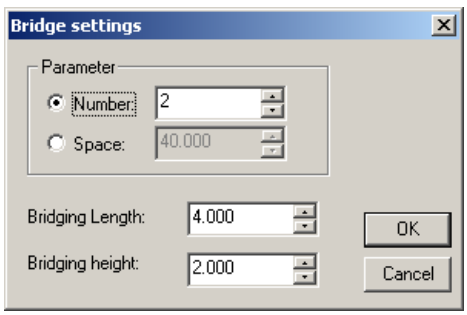


Fig. 10-12

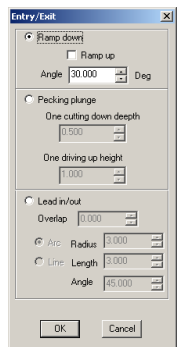
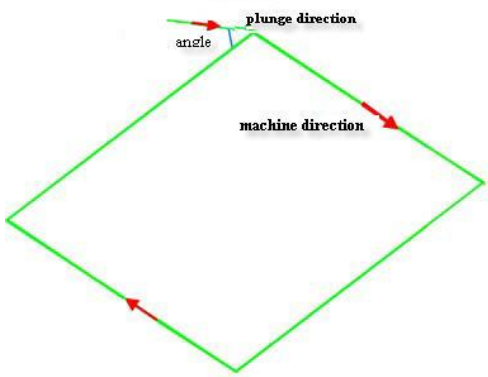


Fig. 10-13

Plunge: There are 3 ways to plunge. (Fig. 10-13)

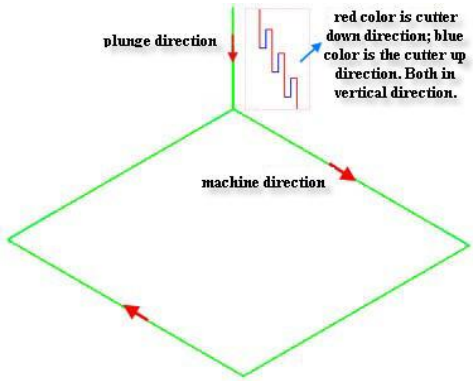
1. Ramp

Ramp is to plunge in a certain angle. Set the value in the dialog, and then press **OK**. The tool goes into the material not in Z axis direction but in slanting direction so that the tool will not be destroyed or broken because of the force during entering material. This also ensures that no mark or scar is left on the surface of the material. If check the “ramp up””, the tool will retract in slanting direction to ensure the seperation between the part and stock , even if the stock is deforming.



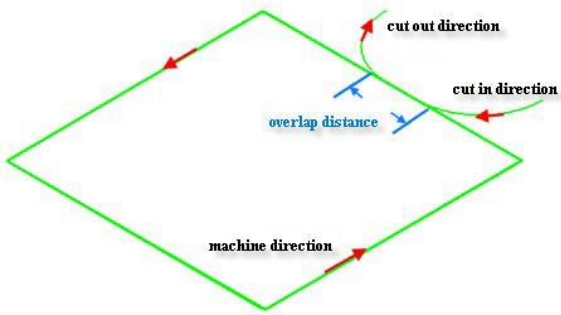
2. Pecking plunge

When using Pecking plunge, the tool goes into a certain depth into the material, and then goes up to a certain height, and repeat this process when cutting the material. Pecking plunge prevents the tool breaks especially when cutting hard materials.


plunge direction
red color is cutter down direction; blue color is the cutter up direction. Both in vertical direction.
machine direction

3. Lead in / out

When using Lead in / out, the tool first goes into a certain depth outside of the material, and then cuts into the side of the material.



REMARK: Bridge and Plunge can not be activated at the same time.

Total depth: is the total depth the tool goes into the material during machining.

Sequence: is to machine in the shortest tool path, thus saving the machining time. (**Near First**: the nearest object to the tool will be machined first. **X/Y First**: machine objects along X/Y axis direction first.)

Multi layer: When the depth of the material is bigger than the tool height or when the material is of high rigidity (such as metal), the machining is done layer by layer on the material.

Depth first: machine next object after finishing machine all the layers of one object.

Cut direction: is the direction of the tool path, including default direction, clockwise and anti-clockwise. When choosing cutting direction, the material should be taken into consideration so that the surface of the material after being machined is smooth. Clockwise machining is fit for cutting materials of high density, such as Acryl (organic glass), brass, etc; anti-clockwise machining is fit for cutting materials of low density such as PVC board, two-color board, etc. Besides, you can also change the cut direction by clicking **Modify->Direction** on the menu bar (see Fig. 10-14). Then you can see the current cut direction. Click on the tool path, and a dialog is shown. Click on **OK** or press the **Enter** key on the keyboard to change the cut direction. (Fig. 10-16) Click the right mouse button if you do not need to preview the tool path.

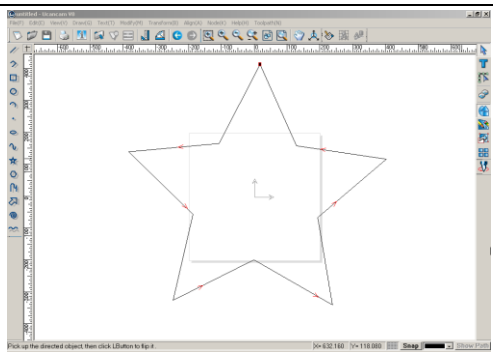


Fig. 10-14

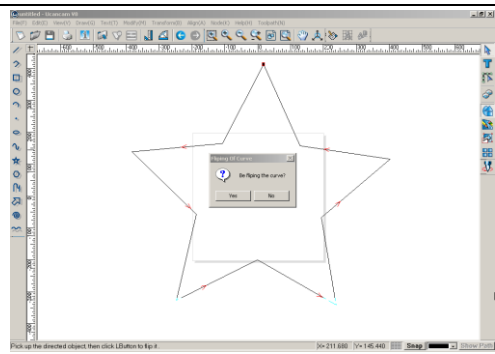


Fig. 10-15

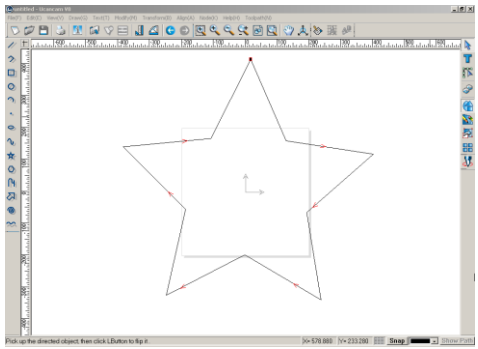


Fig. 10-16

10.2.2 Example

Now we are going to introduce profile machining through an example.

1 Open a new file, and draw a circle in the drawing window. (Fig. 10-17)

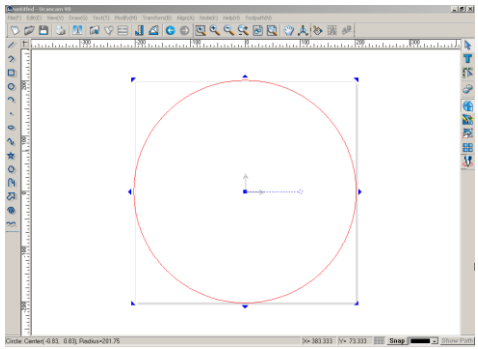


Fig. 10-17

2 Select the circle, and click on the shortcut icon on **Tool Path Bar** or click **Tool path**->**Profile machining** on the menu bar. Then the dialog shown in Fig. 10-11 is displayed.

3 Select an end mill with a diameter of 10 and height of blade of 22, and set the value of total depth at 10mm and choose clockwise cut direction. Then the effect is shown in Fig. 10-18.

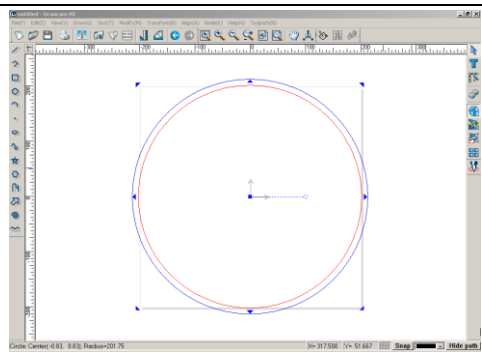


Fig. 10-18

REMARK: In profile machining, you should choose end mill or conical but not ball nose because ball nose is not fit for profile machining.

10.3 Area Clearance

Area clearance is to mill an area in the material. There are two types of milling: raster and offset. For example, we are to mill the rectangle in Fig. 10-19.

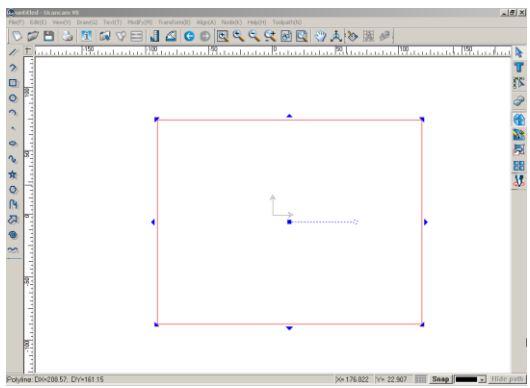


Fig. 10-19

1 Select the rectangle, then click on the shortcut icon on **Tool Path Bar** or click **Tool path->Area Clearance** on the menu bar. Then the **Area Clearance** dialog is displayed.

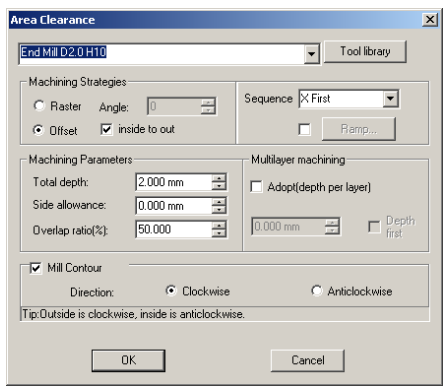


Fig. 10-20

2 Input the parameters in the dialog.

Tool Library: is for selecting a tool. You can also select a tool in the drag down list.

Machining strategies: is to select raster or offset area clearance. (When choosing raster, you can adjust the angle. when choosing Offset, you can choose inside to out according your need), specially for offset strategy, the transition between the loop is tangent continue arc , and the sharp angle in loop is also transited by arc, therefor this strategy is fit for high speed machine.

Machining parameters: total depth, side allowance, overlap ratio and contour allowance.

Overlap ratio: is the ratio of the width of the tool bottom blade to the width of the last tool path.

The reason why we need to set overlap ratio is that we need to take the width of the tool into consideration during machining. If the overlap ratio is too low, then some parts of the material will not be machined; if we keep the space between tool paths as close as possible, then the surface of the material after machining will be smooth. However, if the overlap ratio is too high, then the machining efficiency will be reduced.

Next we are to introduce overlap ratio further through an example.

Fig. 10-21 is the effect with the overlapping rate of 0, and the shadowing area in Fig. 10-22 is the overlapped part of the tool.

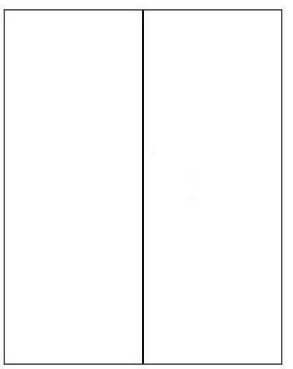


Fig. 10-21

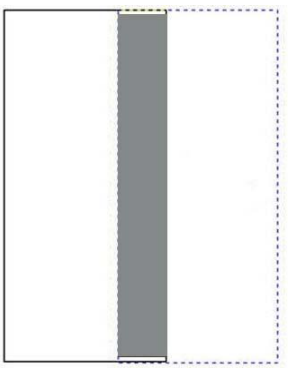


Fig. 10-22

Note: Ball nose tool should not be used in area clearance. Fig. 10-23 shows the result if ball nose tool is used in area clearance or milling. (The area in black is the part which is not machined.)

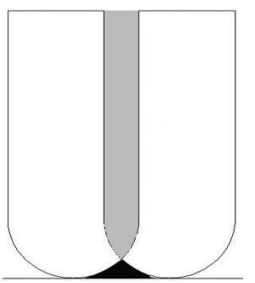


Fig. 10-23

Side allowance: is the area outside the tool path. Precision cutting can be achieved through setting side allowance.

Mill contour: This is to make the surface of the material smooth after being machined.

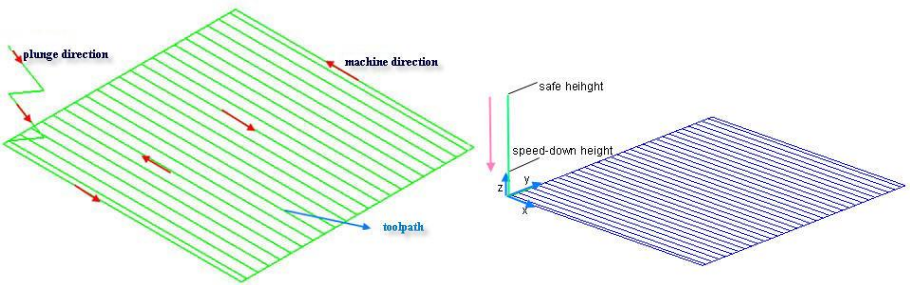
Multi layer: When the depth of the material is bigger than the tool height or when the material is of high rigidity (such as metal), the machining is done layer by layer on the material.

Adopt: you can set the depth per layer.

Depth first: Machine next object after finishing machine all the layer of one object.

Sequence: is to machine in the shortest tool path, thus saving the machining time. (**Near First**: the nearest object to the tool will be machined first. **X/Y First**: machine objects along X/Y axis direction first.)

Ramp: When we do area clearance, we usually use mill cutters, and mill cutters are too fragile to cut if we use it to cut into the material at right angle. With ramp function, the cutter breaks can be well prevented because the tool goes into the material in a certain angle.



3 If we choose the end mill with a diameter of 20 and height of 10, set the angle at 0, the total depth at 2mm, overlap ratio of 50%, clockwise machining, then the effect is shown in Fig. 10-24. If we choose offset, the effect is shown in Fig. 10-25.

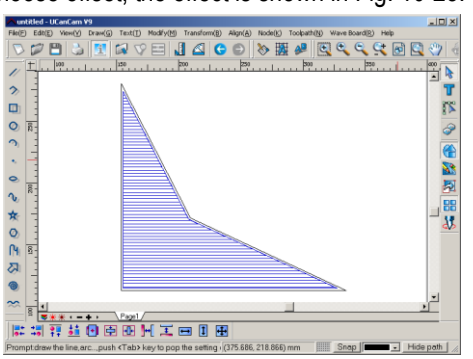


Fig. 10-24

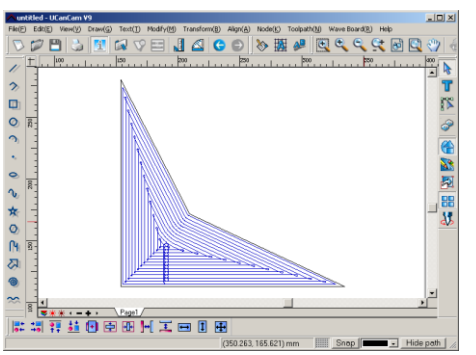


Fig. 10-25

10.4 3D Engraving

3D engraving is to make the material surface smooth and to ensure the definition, precision and third dimension effect of the machined object. It is mainly used in seal engraving and engraving of characters with special effects.

3D engraving includes top and bottom engraving, and the difference between them is the size of the machining area.

Next we are going to see an example.

1 Input text “UCA” and draw a rectangle around it in the drawing window. (Fig. 10-26)

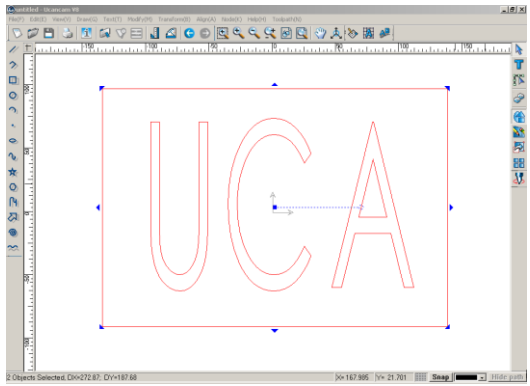


Fig. 10-26

2 Select the text and the rectangle, and then click on the shortcut icon on **Tool Path Bar** or click **Tool path->3D engraving** on the menu bar, then the **3D Engraving** dialog is displayed. (Fig. 10-27) if you input parameter of Min upcast distance, times of engraving can be reduced.

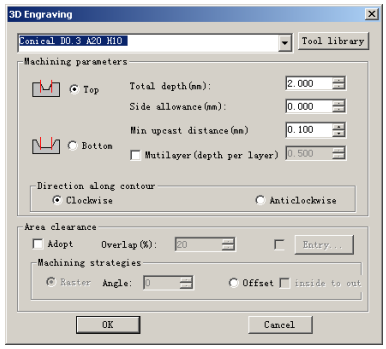


Fig. 10-27

3 Select a conical tool in the tool library with a diameter of 0.2, height of 10, angle of 30 degrees, and select **Top** in **Machining parameters** with the total depth of 5mm, overlap ratio of 60%, clockwise engraving, and then the effect is shown in Fig. 10-28.

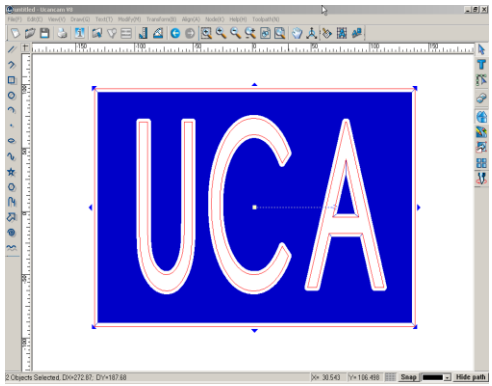


Fig. 10-28a

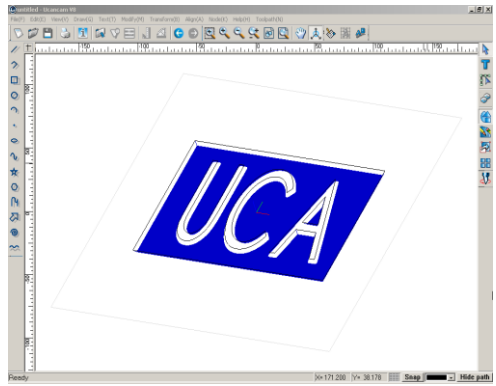


Fig. 10-28b

4 If we choose bottom engraving and set the other parameters the same as above, then the effect is shown in Fig. 10-29.

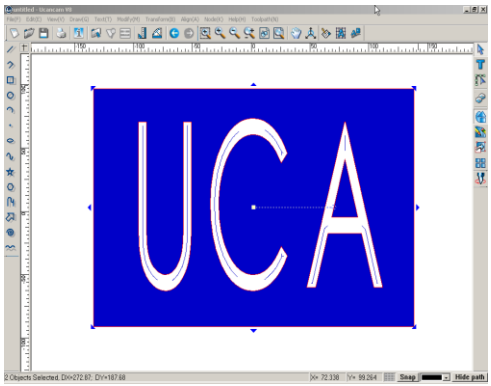


Fig. 10-29a

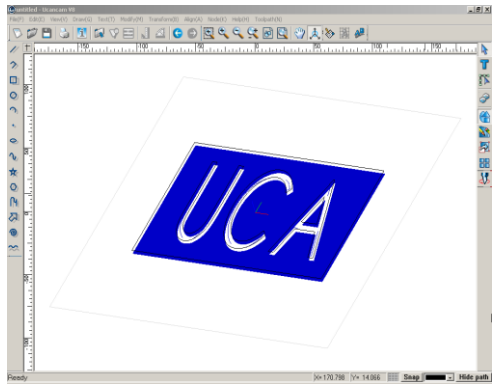


Fig. 10-29b

REMARK: You should choose a proper tool in 3D engraving. If the diameter and angle of the tool are too large, then the tool can not go into some tool paths, resulting in imperfect effect.

10.5 Midline Machining

Midline machining is to machine along the middle axis of the drawing, and there are three types of midline machining: 2D machining, 3D engraving and 3D cone. The cut depth in 2D machining is fixed, and the material is cut along its midline and during 3D engraving the cut depth is automatically adjusted according to the shape of the object and the tool used. During 3D cone engraving, the cut depth is also automatically adjusted according to the shape of the object and the tool.

Reverse machining is to machine along the original tool path in the reverse direction again after first-time machining in order to make the surface of the material smooth.

Sequence: is to machine in the shortest tool path, thus saving the machining time. (**Near First**: the nearest object to the tool will be machined first. **X/Y First**: machine objects along X/Y axis direction first.)

For example, machine the two letters “OP”.

1 Input the two letters in the drawing window.

2 Select the two letters and click on the shortcut icon in **Tool Path Bar** or click **Tool path->Midline machining** in the menu bar, then a dialog is displayed. (Fig. 10-30) if you input Parameter of Min midline length, the branch of midline can be under control.

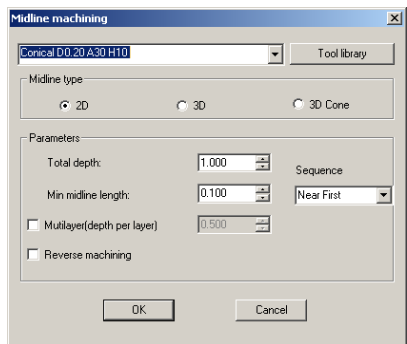


Fig. 10-30

3 Select a conical tool with a diameter of 0.3, height of 10 and angle of 45 degrees, total depth of 6, and select reverse machining, 3D. Then the effect is shown in Fig. 10-31.

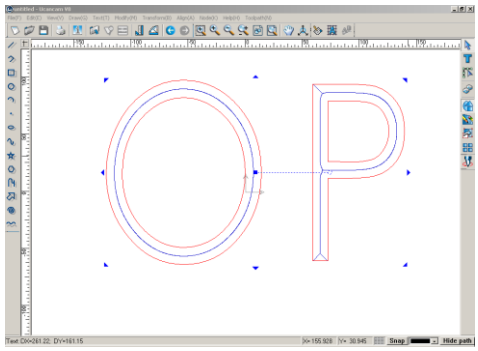


Fig. 10-31

10.6 Simple Drilling

Before drilling, you set the Total depth, point space and machine type parameters. Set the parameter of point space can control the space between two points. Three Drill Position: on points, on curves, on center of object.

E.g.1: to drill the shape shown in Fig. 10-32.

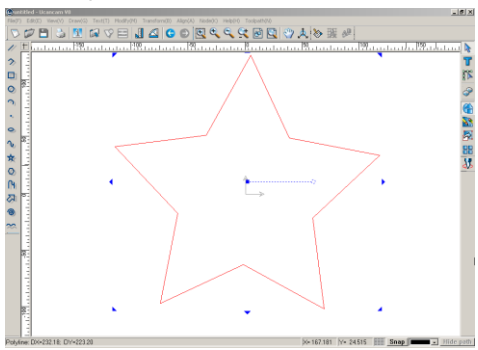


Fig. 10-32

1 Select the object, then click on the shortcut icon in **Tool Path Bar** or click **Tool path->Simple drilling** in the menu bar. Then the Simple Drilling dialog in Fig. 10-33 is displayed.

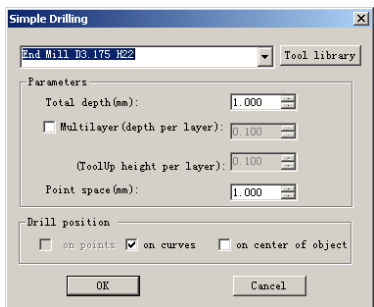


Fig. 10-33

2 Select an end mill tool with diameter of 22 and height of 10, set the total depth at 5, and select on curves, then the effect is shown in Fig. 10-34.

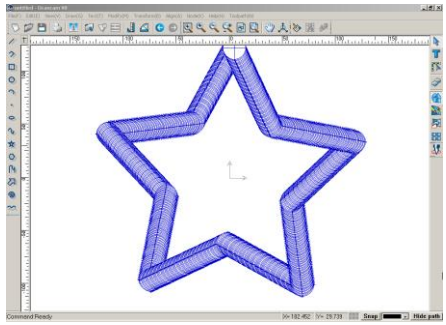


Fig. 10-34

E.g.2: to drill points

1 Draw a point and duplicate it. (Fig. 10-35)

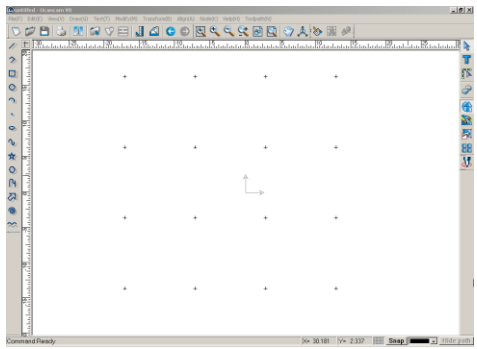


Fig. 10-35

2 Select all the points, and click on the shortcut icon or click **Tool path->Simple drilling** in the menu bar. Then a dialog is shown. (Fig. 10-3) Select an end mill tool with a diameter of 3 and height of 12, set the total depth at 10, and pick up Points. The result is shown in Fig. 10-36.

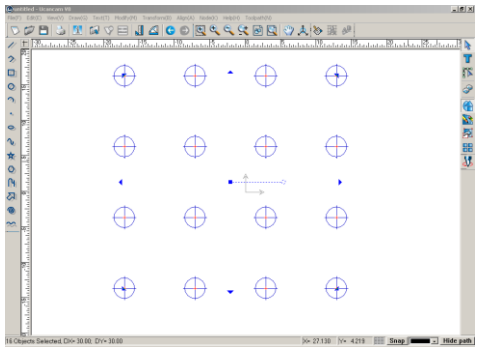


Fig. 10-36

10.7 Region Drilling

Region drilling is to drill in the inner region of the object.

Now we are to drill the region in Fig. 10-37.

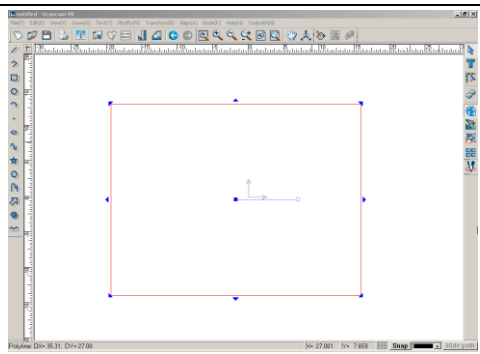


Fig. 10-37

1 Select the object, and click **Tool path->Region drilling** in the menu bar. Then the Region drilling dialog in F10-38 is displayed.

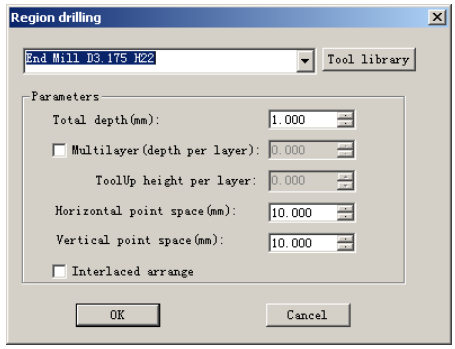


Fig. 10-38

Horizontal point space: is the distance between two points in the horizontal direction

Vertical point space: is the distance between two points in the vertical direction

Interlaced arrange: is interlaced arrangement of the points

2 Select an end mill tool with a diameter of 22, weight of 10, total depth of 6, horizontal point space and vertical point space at 44 respectively, and compare the different results when selecting interlaced arrangement and when interlaced arrangement is not selected. (Fig. 10-39)

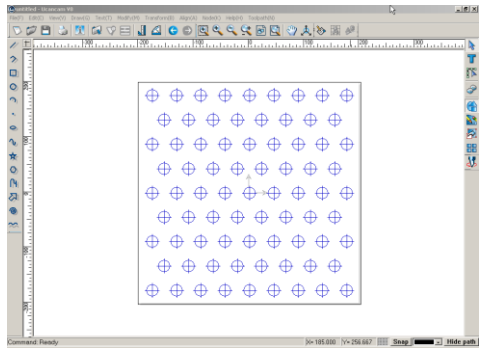


Fig. 10-39 (When interlaced arrangement is chosen)

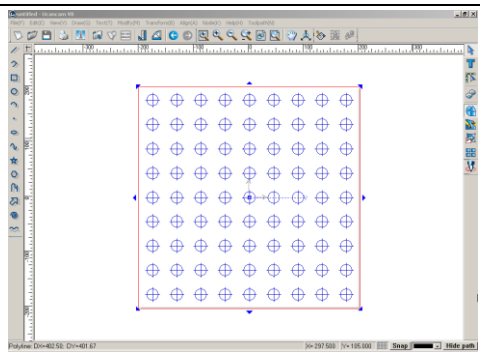


Fig. 10-39 (When interlaced arrangement is not chosen)

10.8 Insert And Inlay

Inserted and inlayed moulds are made by profile machining and area clearance.

Now we take the letter “R” as an example to introduce this function.

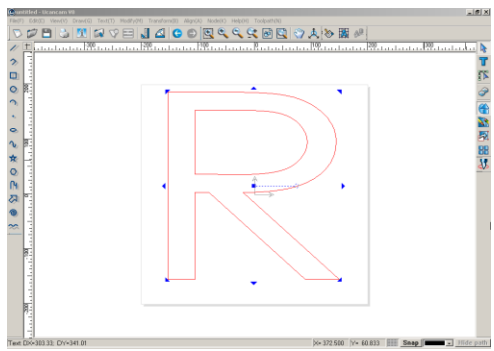


Fig. 10-40

Unilateral clearance is the distance between the inlayed mould and the inserted mould, and the value should be relatively larger when materials of high density are machined. However, it should be noted that too large value of interspacing may result in looseness. This parameter is given in both the dialog of **Inlay** and **Insert**, and you need only input the value in one of the dialog.

The following is the step.

1 Select the character “R”, and then click on the shortcut icon in **Tool Path Bar** or click **Tool path->Insert and Inlay->Insert Machining** in the menu bar. Then the dialog in Fig. 10-41 is displayed.

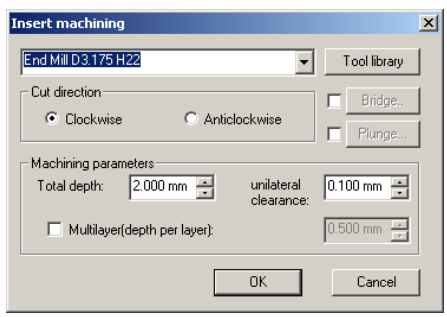


Fig. 10-41

2 Select an end mill tool with a diameter of 3.175, height of 10, total depth of 10, interspaces of 0.3, anticlockwise, and the result is shown in Fig. 10-42.

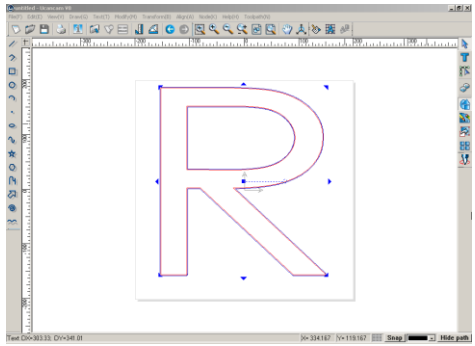


Fig. 10-42

3 Select the letter, and click on the shortcut icon or click **Tool path->Insert and Inlay->Inlay Machining**, and then the following dialog is displayed. (Fig. 10-43)

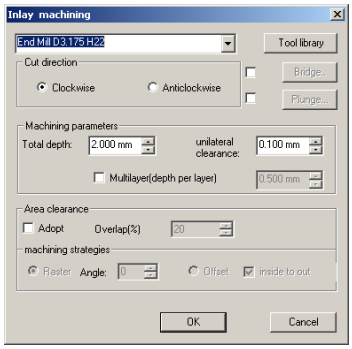


Fig. 10-43

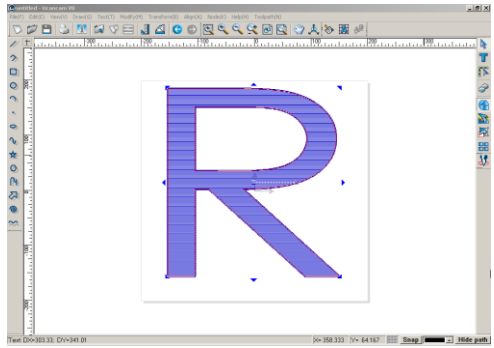


Fig. 10-44

4 Select an end mill tool with a diameter of 3.175, height of 10, total depth of 6, interspace of 0.3, anticlockwise, overlap ratio of 50, and the result is shown in Fig. 10-44.

10.9 Prism Machining

Features of prism machining in Ucancam include:

Multilayer engraving: Objects are machined layer by layer. In this way, material is saved and machining speed is improved, especially fit for machining artworks and characters with prisms.

Easy operation: Prism machining is very easy to use. Users need only draw the contours of characters with special effects, and input or adjust parameters. Then the tool path is formed.

High efficiency: The tool path is formed quickly, and if multi-layer machining is chosen, high speed and efficiency can be achieved.

Angle type: There are two kinds—rounded angle and cusp angle machining. If rounded angle machining is chosen, then the area between two bordered sides is rounded conical surface.

Next we are going to apply prism machining to the object in Fig. 10-45.

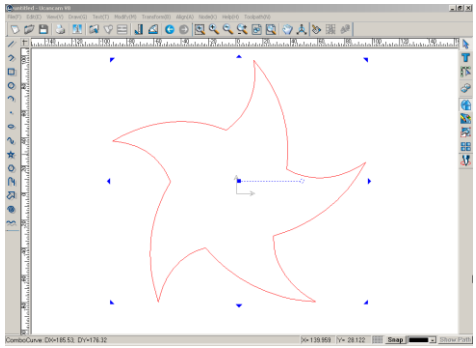


Fig. 10-45

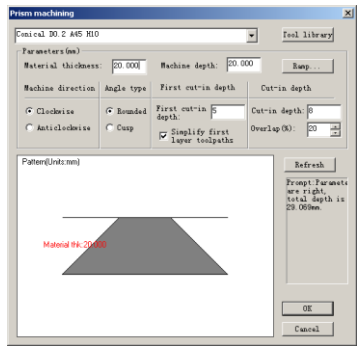


Fig. 10-46

1 Select the object, then click on the shortcut icon in **Tool Path Bar** or click **Tool path->Prism machining** in the menu bar. Then the Prism machining dialog in Fig. 10-46 is displayed.

2 Set the parameters in the dialog.

Tool: This Prism machining effect is only gotten by using the conical tool. Thus, only conical tools are provided in the tool library.

Parameters: You can set the material thickness and machining depth in this section.

Angle type: includes rounded and cusp angles.

Preview window: Prism section created is previewed in this window.

Refresh: if the Prism section created did not show in preview window ,press refresh button.

Prompt: It automatically prompts you whether you have chosen a proper tool, and also lets you know if the cutting depth is right or not.

The system automatically tells users whether the tools or defined depth of each layer is fit for machining.

3 Select a conical tool with a diameter of 0.3, height of 10, angle of 45 degrees, material thickness of 10, machining depth of 39.19, layer depth of 10mm, anticlockwise machining, and the effect is shown in Fig. 10-47. Machining depth, layer and angle vary according to the tools selected.

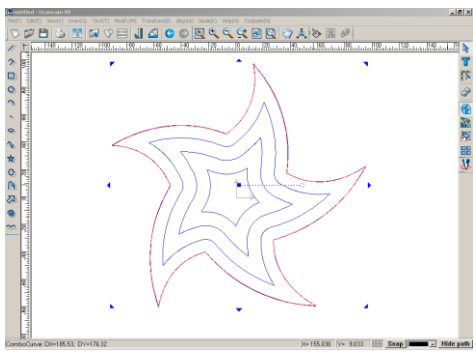


Fig. 10-47

10.10 Intelligent Machining

Efficiency in milling can be greatly improved when applying intelligent machining. Two tools can be

chosen at the same time, and the tool with larger diameter will be chosen for milling for the first time, then the tool with smaller diameter will be used in milling for the second time so that the smaller areas which are not milled in the first round of milling by the larger tool can be milled. By using the tool with larger diameters, the machining speed is greatly improved, and by using the tool with smaller diameters, accurate machining is achieved.

Take the object in Fig. 10-48 for example.

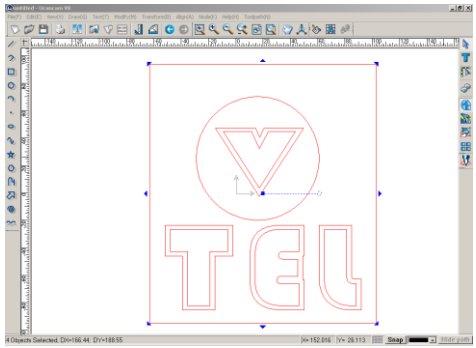


Fig. 10-48

1 Select the object, and then click on the shortcut icon in **Tool Path Bar** or click **Tool path**-> **Intelligent machining** in the menu bar. Then the Intelligent machine dialog is displayed (F10-49).

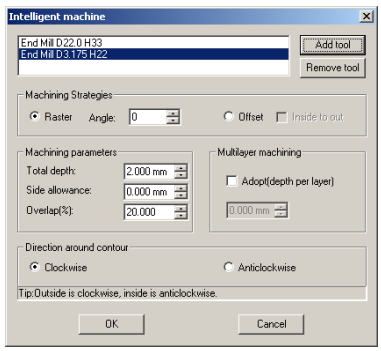


Fig. 10-49

2 Set the parameters in Fig. 10-49.

3 Select two end mill tools with diameter of 3.175 and 22 respectively, total depth of 3mm, overlap of 90%, anticlockwise. Then the effect is shown in Fig. 10-50.

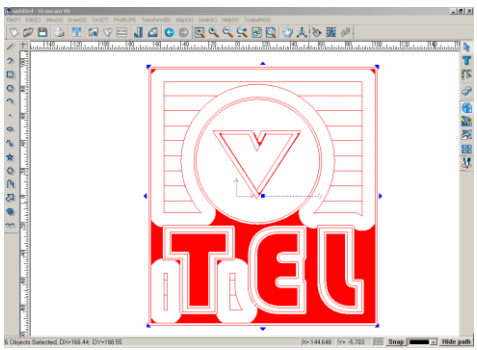


Fig. 10-50

The area with dense lines is the tool path of the smaller tool with a diameter of 3.175, and the other area is the tool path of the tool with a diameter of 22.

10.11 Embossing Machining

Embossing machining is mainly used in making rounded characters or shapes.

There are two types in embossing machining: intaglio machining. The operation of embossing machining is quite easy, and it is widely used in such fields as embossment sign boards, badge, furniture, metallic moulds, printing, etc.

Take the object in Fig. 10-51 as an example.

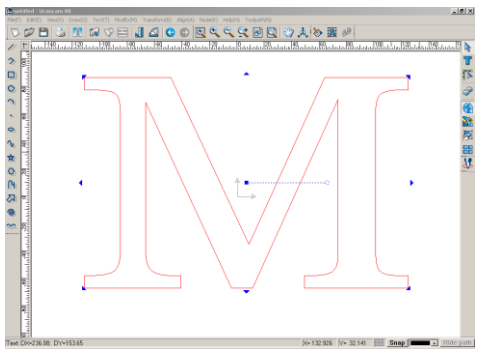


Fig. 10-51

1. Select the object, and click on the shortcut icon in **Tool Path Bar** or click **Tool path->Embossing machining** in the menu bar. Then the dialog in Fig. 10-52 is displayed.

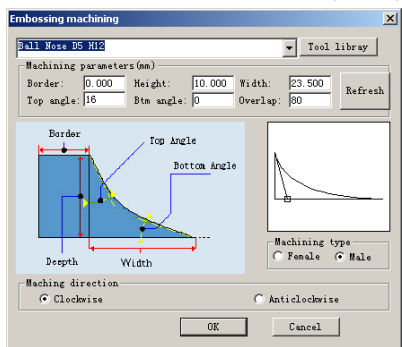


Fig. 10-52

2. Set the parameters in the Embossing machining dialog.

Parameters

Border: is the distance between the border of the contour and the tool path

Height: is the total machining depth

Width: is the width of the tool path

Top angle: is the angle formed by the vertical direction and the tool when it is entering the material

Bot angle: is the angle formed by the horizontal direction and the tool when it is entering the material

Machining type: includes female and male machining.

3 Select a ball nose tool with a diameter of 6, height of 12, border of 0, machining height of 6, width of the default value 14.762, top angle of 0, bot angle of 0, overlap of 80%, anticlockwise, then the effect

is shown in Fig. 10-53.

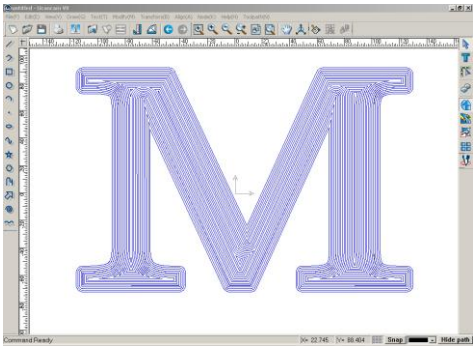


Fig. 10-53

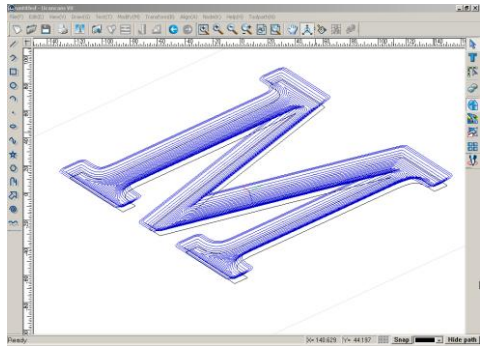


Fig. 10-54

Fig. 10-54 is 3D view of the tool path.

10.12 Image AM/FM Machining

Image AM/FM machining is to engrave the object after the image is converted into grayscale image.

AM machining is to make the distance between the dots the same while the depth of the dots are different.

FM machining is to make the depth of the dots the same while the distance between the dots is different.

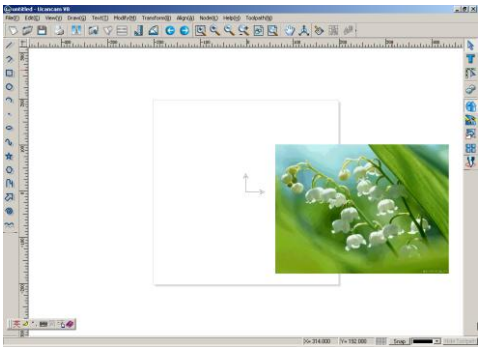


Fig. 10-55

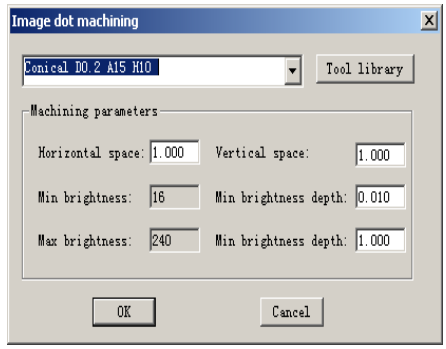


Fig. 10-56

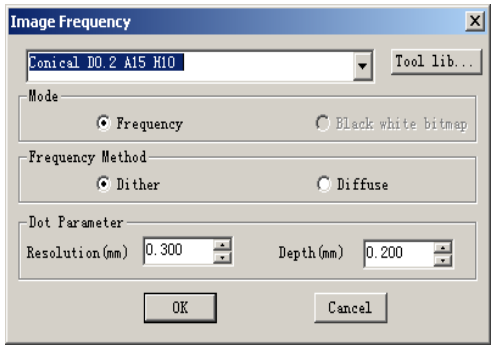


Fig. 10-57

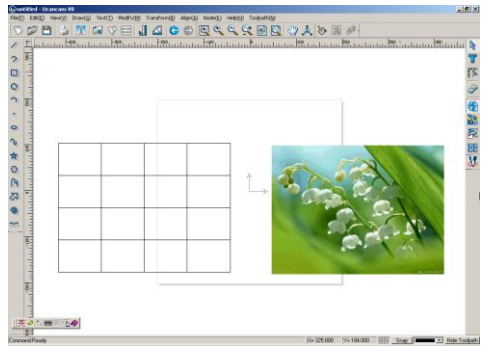


Fig. 10-58

Horizontal point space: is the distance between two points in the horizontal direction

Vertical point space: is the distance between two points in the vertical direction

Min brightness depth and **Max brightness depth:** is the depth tool goes in to material during machine.

Mode: choose different mode for different picture.

Frequency: is used for common picture processed by Ucamcan**.**

Black white bitmap: is used for the Black white bitmap processed by other software.

Frequency Method:

Dither: is to make the surface of processed image seems smoother.

Diffuse: is to highlight the details

10.13 Image Relief Machining

Image relief machining is to engrave the object after the image is converted into grayscale image. The machining is based on brightness level.

Min brightness depth and max brightness depth are the depth by which the tool goes into the material. Horizontal/vertical machining is the direction of the tool path.

Take the image in Fig. 10-59 as an example.

1 Import a file in BMP format.

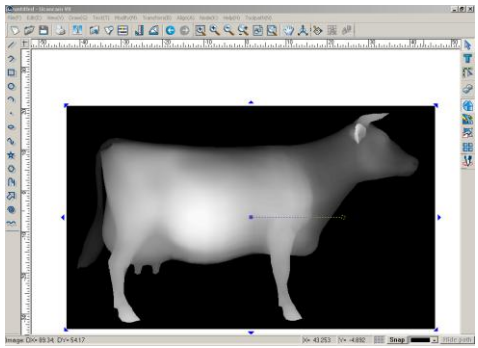


Fig. 10-59

2 Select the image, and click on the shortcut icon in **Tool Path Bar** or click **Tool path->Image relief machining** in the menu bar. Then the dialog in Fig. 10-60 is displayed.

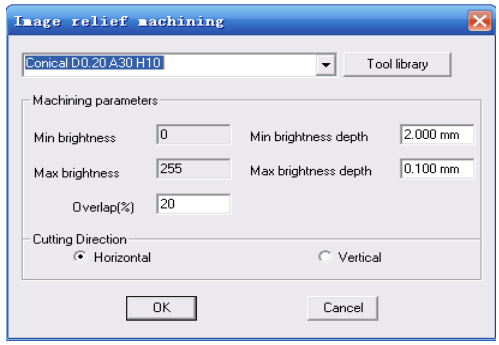


Fig. 10-60

3 Select a conical tool with a diameter of 0.2, blade height of 10, blade angle of 10, min brightness depth of 2, max brightness depth of 0.3, overlap of 50%, and choose horizontal machining. Then the 3D view of the effect is shown in Fig. 10-61.

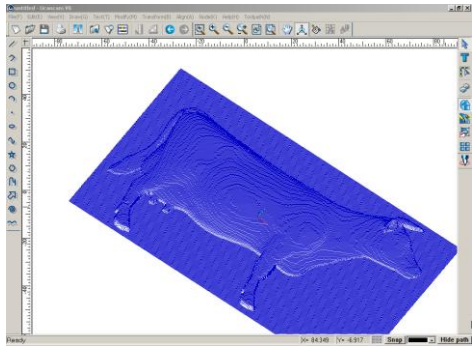


Fig. 10-61

10.14 ToolPath Sequence

Tool path sequence can be adjusted so as to improve machining process and machining quality in case the default tool path sequence is not what you want.

1 Select a tool path, and click **Tool path**->**Tool path sequence** in the menu bar.

2 Then the tool path is marked by numbers. (Fig. 10-62)

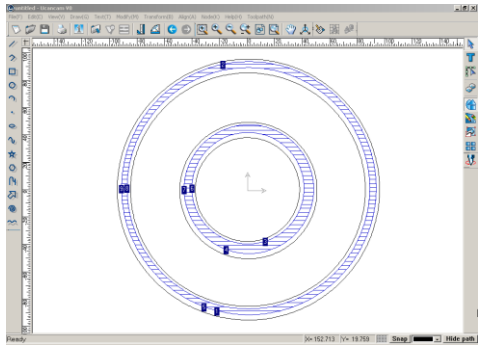


Fig. 10-62

3 Then click a sequence number to change the sequence of tool path. Or you can set the specific sequence number of a tool path unit by clicking the right mouse button on the original sequence number. The context menu displayed is shown in Fig. 10-63.

4 After setting the sequence number in the menu, click the right mouse button again, and a dialog is shown. (Fig. 10-64)

5 Click on **Yes** to save the new tool path sequence, or click on **No** to preserve the original tool path sequence. Fig. 10-65 is the new tool path.

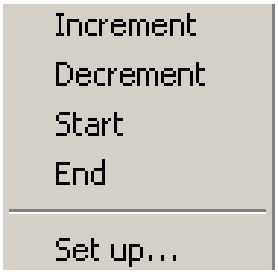


Fig. 10-63

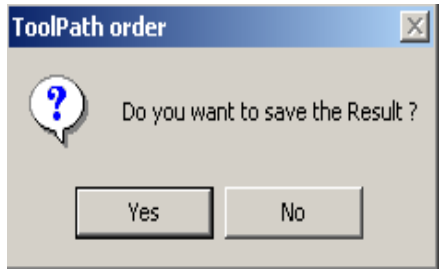


Fig. 10-64

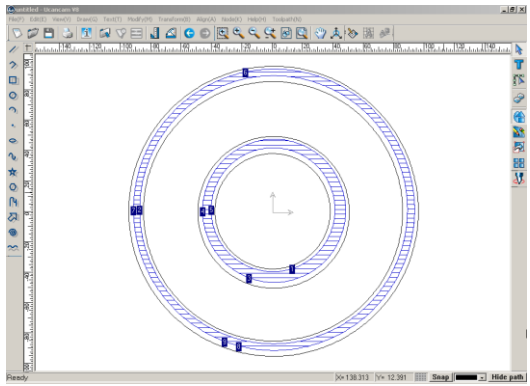


Fig. 10-65

10.15 ToolPath Edit

We can change the shape of the tool path by Tool path edit function. We can add, delete or move nodes of the tool path, or set the starting point. We can also reverse tool path direction. Other functions include bridge, arc fit, and feed.

Click **Toolpath** -> **Toolpath edit** on the menu bar, and then a dialog is displayed.

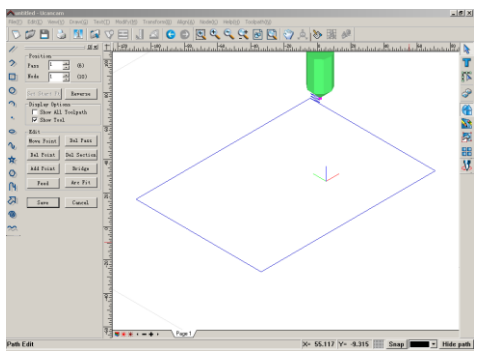


Fig 10-66

Functions available in Tool path edit include:

Pass: You can select different parts of the tool path by adjusting serial number.

Node: You can select different nodes of the tool path by changing serial number.

Set start Pt: You can set any point as the starting point of the tool path.

Reverse: is to reverse the direction of the tool path.

Show All Toolpath: Check it, and you can see all tool paths.

Show Tool: The tool is displayed after you check it.

Move point: You can move a node to a new position or change the shape of the tool path by changing the coordinates of the tool path.

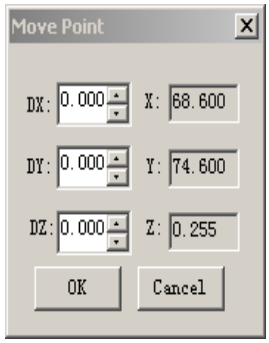


Fig 10-67

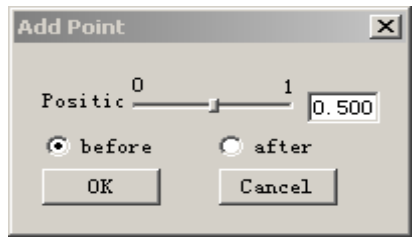


Fig10-68

Add point: You can add nodes in a certain position of the tool path. A dialog is displayed after pressing “Add Point”.

Del point: You can delete any node on the tool path by pressing “Del point”.

Del section: You can delete a selected tool path section. First select the tool path, and then press “Del section”.

Del Pass: First select the tool path section that you want to delete, and then press “Del Pass”.

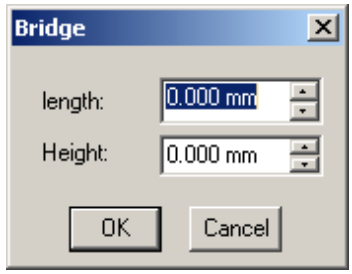


Fig10-69

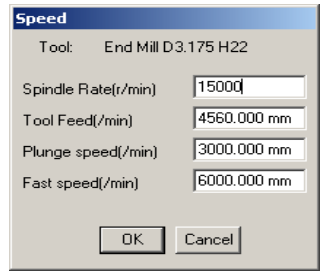


Fig 10-70

Bridge: To prevent cutter from being destroyed or broken because of material move when job is to be finished, you can use Bridge to make the cut object not completed separated from the material. After finishing the job, you can manually take the finished product apart from the material.

Feed: You can set spindle Rate, Tool Feed, Fast speed and Plunge speed in this dialog.

Arc Fit: When it comes to tool path calculation, arcs are better than Bezier curves. By this function, a tool path is automatically changed to an arc, thus machining efficiency is greatly improved.

10.16 ToolPath Transform

With this function, you can change the size of the tool path, change the tool path position, and rotate the tool path.

1 Scale

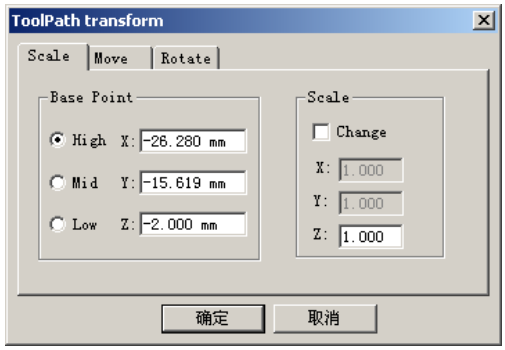


Fig10-71

You can scale the tool path by clicking **Toolpath** -> **Toolpath Transform** on the menu bar. When a dialog is displayed, set the values in it, and then the tool path size is changed. After choosing base point, checking change and setting scale of X, Y, Z, then press **ok**

2 Move

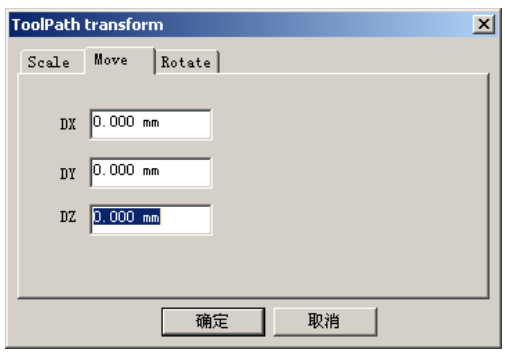


Fig 10-72

You can move the tool path by clicking **Toolpath** -> **Toolpath Transform** on the menu bar. Set the value in the dialog, and then the tool path position is changed.

3 Rotate

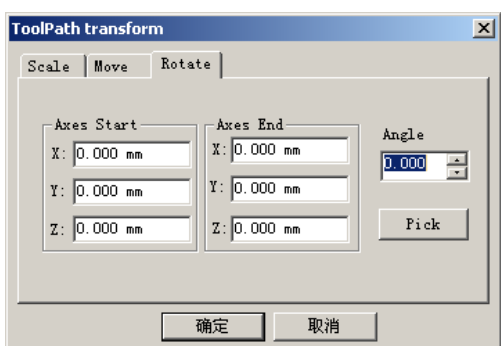


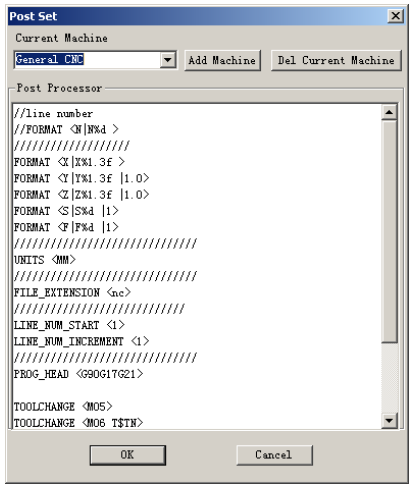
Fig10-73

You can also rotate the tool path by clicking **Toolpath** -> **Toolpath Transform** on the menu bar.

10.17 Post Set

There are many type of CNC systems in the worldwide. The definition for G direction and M direction in the different CNC systems are not quite similar, so that the requirement for command and format in NC

program are also different. Therefore, GCode of toolpath must be processed to adapt to special requirement of every machine and it's control system. This process is called "Post set" in Ucancam software.



Ucancam provided procedures for processor——Post Set so that the toolpath in V9 can be changed to CN code. Select Toolpath->Post Set, Post Set dialog is shown. you can add machine by click Add Machine button or delete machine by click Del Current Machine button.The parameters of Post Processor file include Head of programme, Tail of programme, ToolChange, Units, Format etc, these file are saved in the post sub-directory in the installing directory.

After setting parameters click **OK** to save them. The subsequent Toolpath will be ouput according to the post processor file.

10.18 ToolPath Output

After the tool path is created, you can save it. Various file formats are provided by Ucancam post processor file.

For example, we apply area clearance and contour cutting to the object in Fig. 10-74.

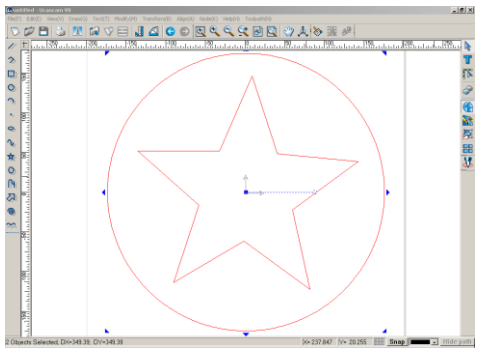


Fig. 10-74

In tool path module, select the object and apply area clearance and profile machining to it. Then the effect is shown in Fig. 10-75.

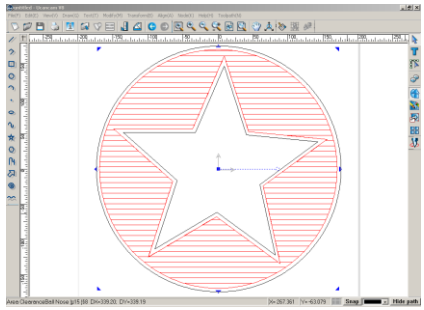


Fig 10-75

REMARK: When creating the tool path of several objects, it is better to hide the already-formed tool path in order to make the operation easier.

Select the tool path to be saved or click on the shortcut icon on **Toolpath Bar** or click **Tool path->Tool path output** in the menu bar. Then the dialog in F10-76 is displayed.

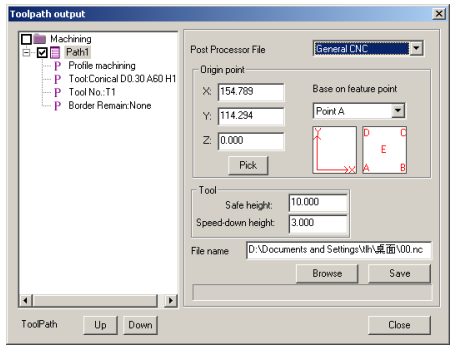


Fig. 10-76

Parameters

Post processor file: normally select “General CNC” is OK, if you want output the toolpath in inch. Or your control system has special requirement, you shoul modify the post processor , for example moidify the “UNITS <mm>” to “UNITS <inch>” in the post processor file. If you need more help, you can contact with us .

Origin point: is the origin of the tool before machining is carried out.

There are 3 ways to set origin point:

1. Custom : You can custom the position of the origin, input the value of X, Y and Z, then save toolpath.

2. Save as before: Automatic memory the previous path position, and even restart the software.

3. Base on feature points : You can select the position of the five points(A,B,C,D,E) , The location of the machining area is different according to the feature points selected. Take badge making as an example. Fig. 4 shows the location of the machining area with the origin at (0, 0).

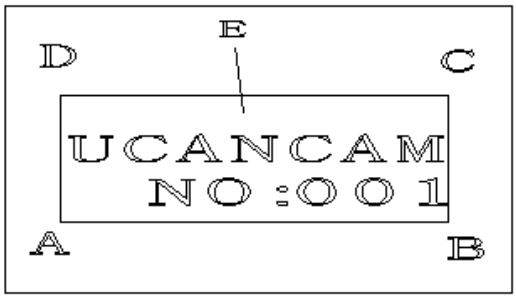


Fig10-77a

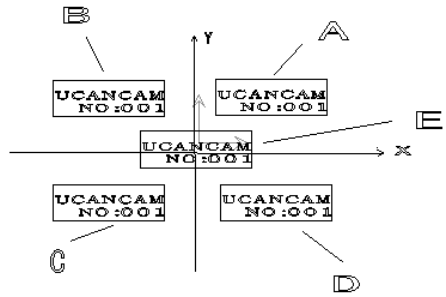
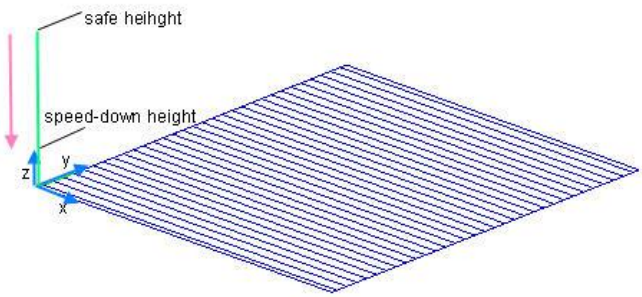


Fig. 10-77b

In order to make origin setting more flexible and the engraving more convenient, the function “Based on feature points” is available in Ucancam.

Safe Z height: is the distance between the tool position and the material surface when the tool is traveling above the material.

Speed-down Z height: is the distance between the material surface and the position tool beginning to decelerate.



Z axis reverse: in ucancam, the downward direction of original is Z axis direction, after checking **Z axis reverse,** the saved pool path is along the opposite direction of Z axis.

File name & Save: Click on “Browse” to select the tool path to be saved, name the file and then click on **Save**. Then the tool path is saved in the file you have named.

Up & Down: In case several tool paths are needed when machining an object, then you need to arrange the order of the tool path.

Delete: A tool path can be deleted if you do not need the tool path.

REMARK: A tool path can be deleted only after putting a tick before it. It can also be deleted if you select the path in the active area first before the path turns red, and then click on **Delete**.

The tool path list is displayed after pressing the right mouse button. Select one tool path, and click the right mouse button. Then the menu in Fig. 10-78 is displayed. You can move up or down or delete the tool path by choosing one of the commands in the menu.

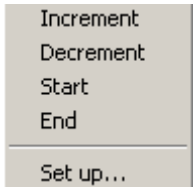
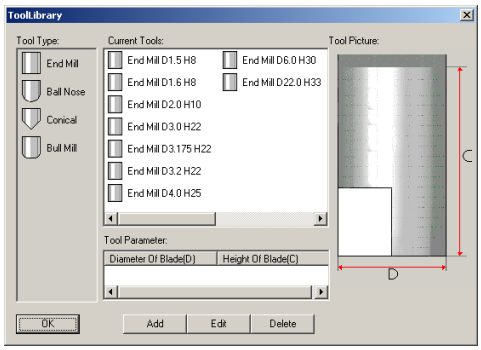


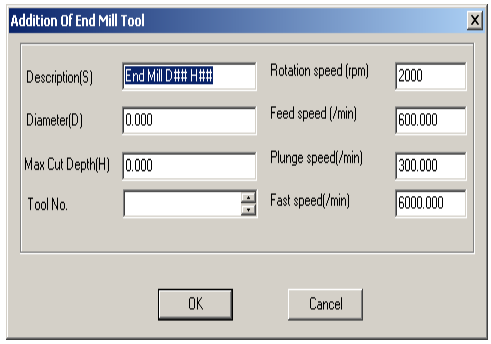
Fig. 10-78

Auto Tool Change

Working efficiency can be improved by Auto Tool Change function. Two ways to achieve this function:

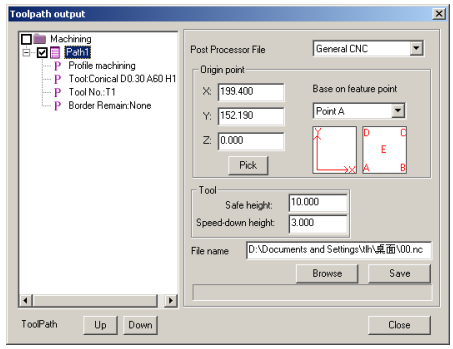
1 Before generating toolpath, you should edit serial number of tools in the tool library. Click **Toolpath->Tool Management** on menu bar, **Tool library** dialog is shown, then select tool in the tool library and press **Edit** button, the dialog of **End Mill Tool Editor** is shown for you to edit Tool No.





2 After generating toolpath, you can modify tool No. in the dialog of **Toolpath output**. Click **Toolpath->Toolpath output** on menu bar, **Toolpath output** dialog is shown, select **Tool No.** in the list of Path and press

button to modify the tool No.



10.19 ToolPath Walk Simulation

Machining path can be previewed though tool path walk simulation, thus avoiding trial cutting and reducing cost.

1 Select the tool path to be machined.

2 Then click on the shortcut icon in **Toolpath Bar** or click **Toolpath->Tool path walk simulation** in the menu bar. Then the dialog in Fig. 10-79 is displayed.

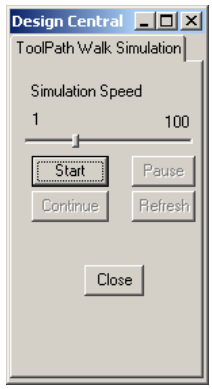


Fig.10-79

3 Adjust simulation speed and click on **start** to see the machining process.

In tool path walk simulation, the green frame is the path of cutting or other engraving method, and the red frame is the tool path of tool lifting. You can also stop tool path walk simulation process. Click on **Refresh** if you want to renew the tool path.

4 Click on **Continue** to resume simulation from where it stopped. (Fig. 10-80)

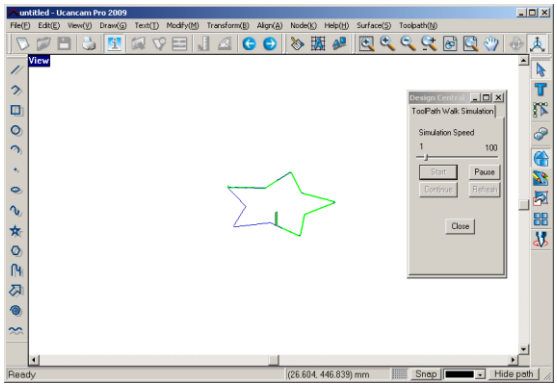


Fig. 10-80

10.20 ToolPath Shaded Simulation

Toolpath shaded simulation is to preview cutting or engraving processin realistic render mode. Simulated results can be rotated or scaled in order to be viewed from different angles.

Parameters like simulation speed, precision and stock size can be set in dialog; length, thickness, margin, machining rate, machining type, machining tool are all displayed in the dialog. You can also set the texture of stock, and Mill color, V9 paints the machined regions with the selected color.

For example, we first apply embossing machining to the characters in Fig. 10-81. After the tool path is calculated, select the path, and then click **Toolpath->Toolpath shaded simulation** in the menu bar. Then the dialog bar displayed on the left of the page to set the parameters. Enter the parameters, and click on **start** to see the simulation.

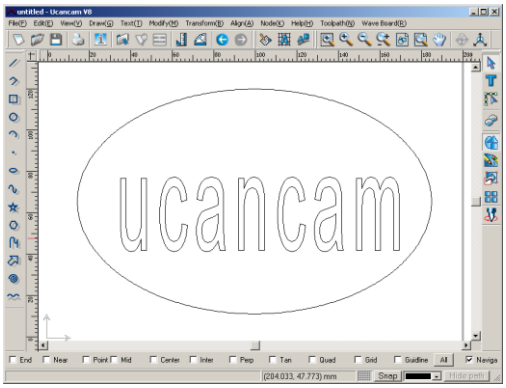


Fig. 10-81a (object)

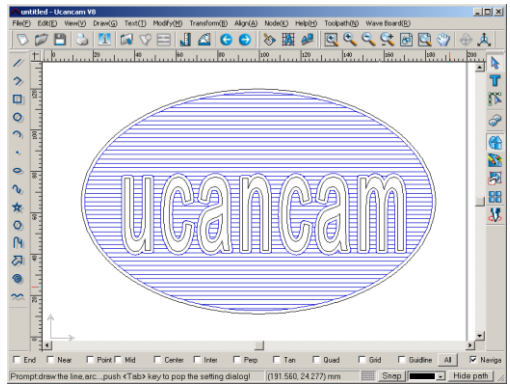


Fig. 10-81b (tool path)

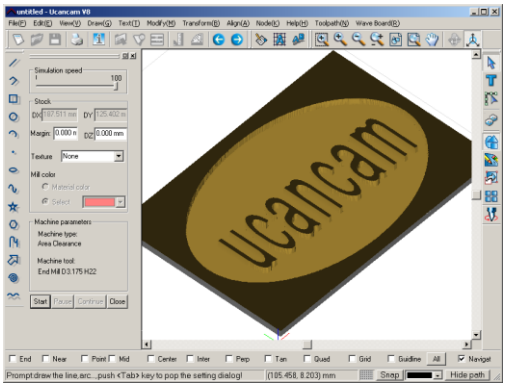


Fig. 10-81c simulation(none)

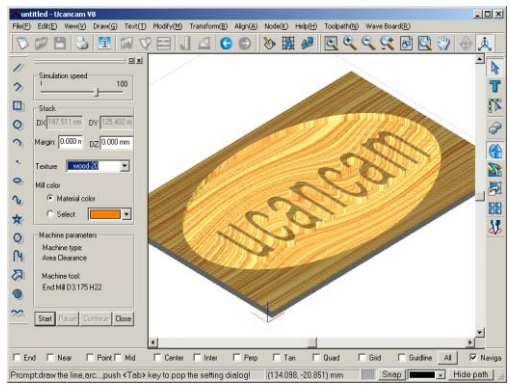


Fig. 10-81d simulation(Material Color wood-20)

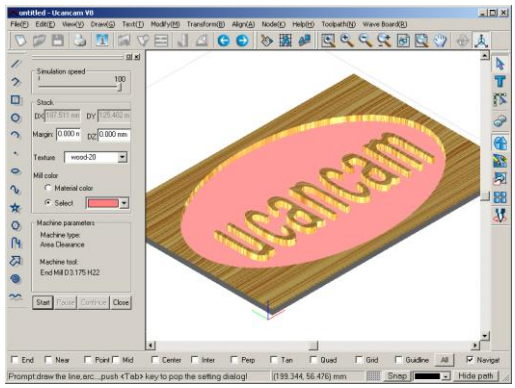


Fig. 10-81desimulation(select color & wood-20)

10.21 ToolPath Panel

Tool path panel is used to separate a tool path into several smaller portions so that you can machine materials accurately even when the work area of your machine is not big enough. After machining, you can combine the portions together to form a complete one. In this way, not only machining time is reduced, but also efficiency is improved.

To apply tool path panel to a tool path

1 Select an object.

2 Apply a tool path calculation to the object to form a tool path.

3 Click on the tool path.

4 Click **Toolpath->Toolpath Panel** in the menu bar.

5 A dialog **Toolpath Panel** is displayed.

6 Set the parameters in the dialog, and click on **OK** to validate the setup.

Then the tool path is separated into several parts.

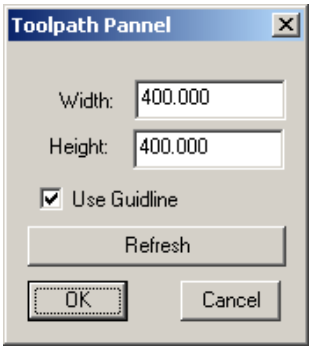


Fig. 10-82 (Dialog)

Parameters include:

Width: is the width of each independent tool path after applying tool path panel.

Height: is the height of each independent tool path after applying tool path panel.

Use Aid line: is to use the guide line as the aid line to separate a tool path.

Refresh: is to reset the above parameters.

REMARK: When applying Toolpath panel to a tool path, you should put the object in the drawing window (the grey rectangular box); otherwise, the function is invalid.

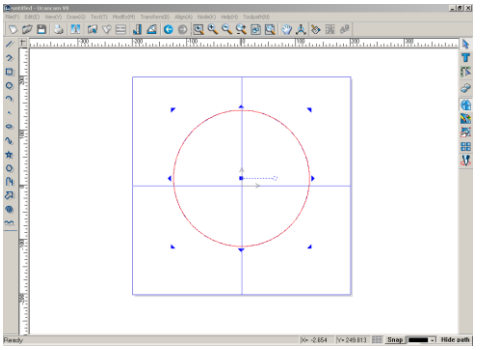


Fig. 10-83 (Tool Path Panel)

10.22 Group Toolpath

You can group several toolpaths as one unit for machining.

Create and select two or more tool paths, and then click on **ToolPath->Group Toolpath** in the menu bar. Then the tool paths are grouped together.

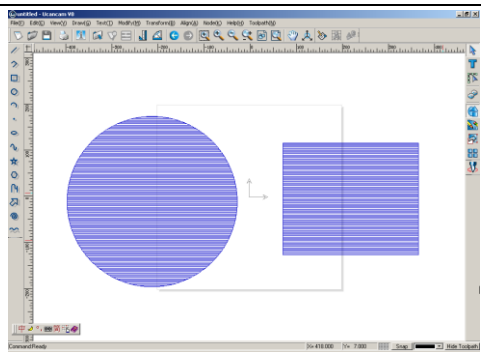


Fig. 10-84

10.23 Ruled Surface

Ruled surface is a surface is generated by curve motion.

1 Draw a wave line which Unit length is 60 mm. Unit Height is 15mm.

2 Copy this wave line to generate another same wave line .Fig 10-85

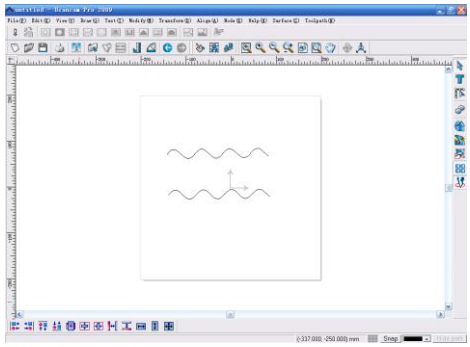


Fig 10-85

3 Pick these two curve, click **Toolpath->Ruled Surface** on menu bar Fig 10-86

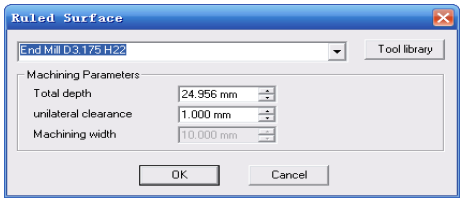


Fig 10-86

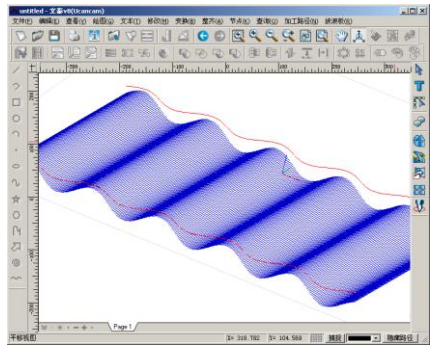


Fig 10-87

4 Key in parameters in dialog and press **Ok** to finish operation .Fig 10-87

10.24 ToolPath Plunge

This is specially for editting profile path plunge. There are three type oy plunge: Ramp, Pecking,Lead n/out. When you have created the profile path, you can modify the path start point and the plunge parameter with it.

Select the profile toolpath, then click on **ToolPath->Toolpath Plunge** in the menu bar. A dialog **Toolpath Plunge** is displayed. According the type of profile path plunge, there are three type of dialog: Ramp dialog, Pecking dialog, Lead in/out dialog in Fig 10-88a, 10-88b, 10-88c.

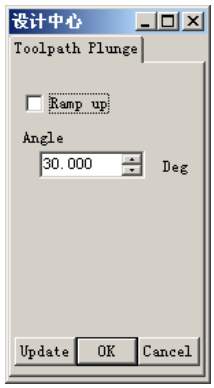


Fig 10-88a

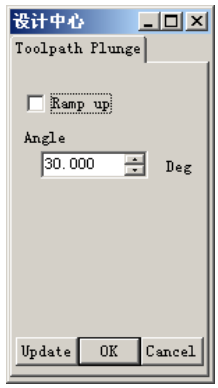


Fig 10-88b

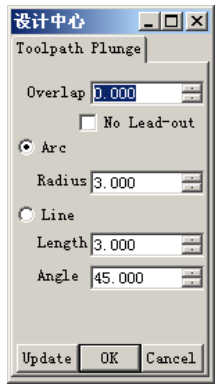


Fig 10-88c

you can modify the start point of profile path by click the start point, and keep the left mouse key down, drag the mouse to move the start point. And the same time the plunge will be modified by the parameter of dialog.

The" Update" button in dialog will modify all the plunge according the parameter of dialog.

The" OK" button in dialog will save all the modified plunge and exit the command.

The" Cancel" button in dialog will cancel all the modified plunge and exit the command.

11. CASES

Several cases are given in this chapter so that users get to know the functions and operation of Ucancam better.

Case1. Profile Machining

1 Launch Ucancam. (Fig. 11-1)

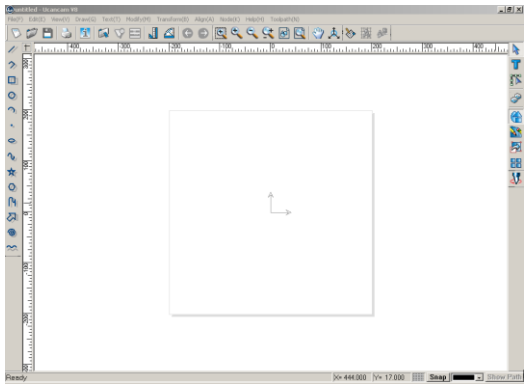


Fig. 11-1

2 Click on the shortcut icon in **Editing Mode Bar** or click **Draw**->**Symbol library** command in the menu bar. Then the symbol library is displayed on the left of the drawing window. Drag a symbol into the drawing window by clicking it and holding the left mouse button. (Fig. 11-2)

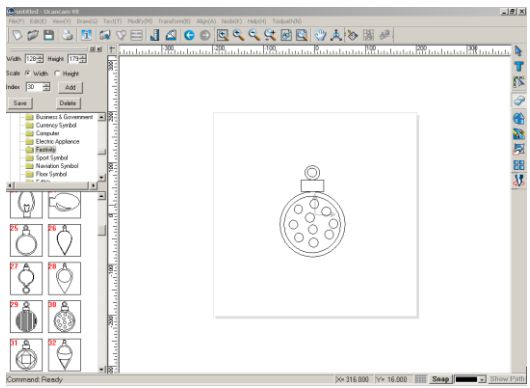


Fig. 11-2

3 Select the symbol and click on the shortcut icon or click **Transform**->**Scale** command in the menu bar. Then the dialog in F11-3 is displayed. Set the parameters. The result is shown in Fig. 11-4.

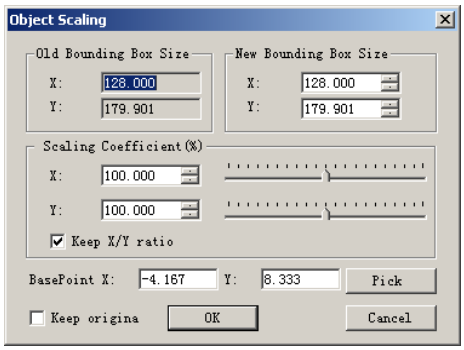


Fig. 11-3

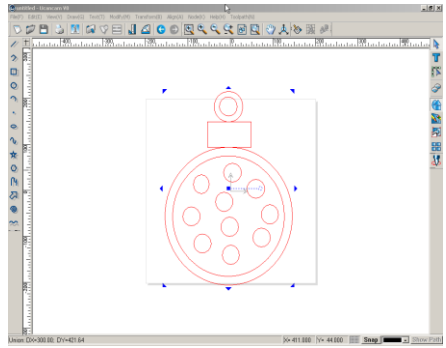


Fig. 11-4

4 Next we are going to calculate the tool path, but remember that you should consider whether the symbol is fit for the tool path chosen. For example, you need to know the relation between the diameter of the tool bit and the smallest line width of the symbol. The diameter of the tool bit should be smaller than the smallest line width. Node editing can be employed to modify the areas that tools can't go into. Fig. 11-5 and 11-6 show the effect before and after node editing.

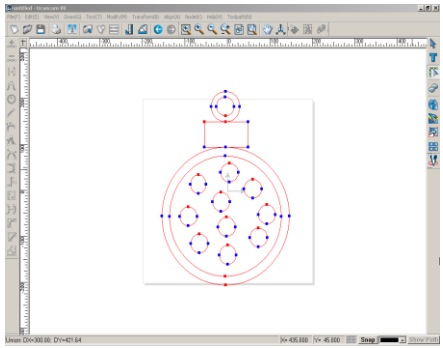
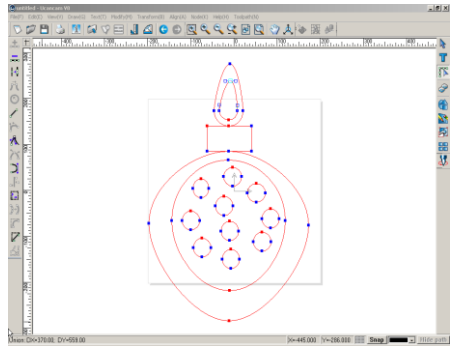


Fig. 11-5



F11-6

5 Select the symbol, and click on the shortcut icon in **Tool Path Bar** or click **Tool path->Profile Machining** command in the menu bar. Then the dialog in Fig. 11-7 is displayed. Set the parameters. Click on **OK** to validate the setup and Fig. 11-8 shows the result.

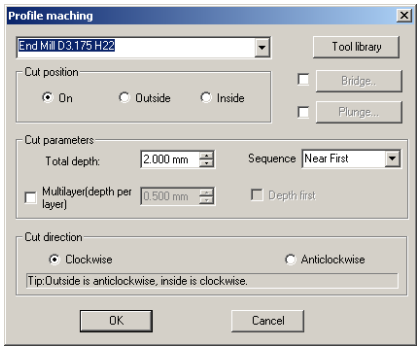


Fig. 11-7

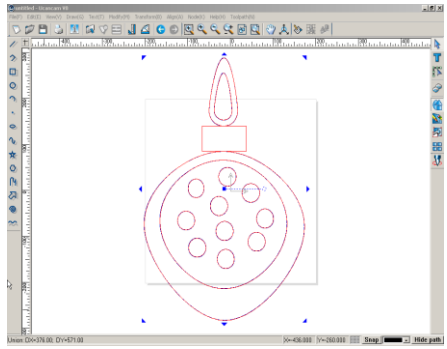


Fig. 11-8

6 Save a tool path

Click on the shortcut icon on **Tool Path Bar** or click **Tool path->Tool path output** in the menu

bar. The dialog in Fig. 11-9 is shown. Click **General CNC** in the post processor File, “Point A” in “Base on feature points” list, and click on “Browse” to select a location to save the file. Name the file as 1.nc, click on **Save**, and then the tool path is saved in the file named “1”.

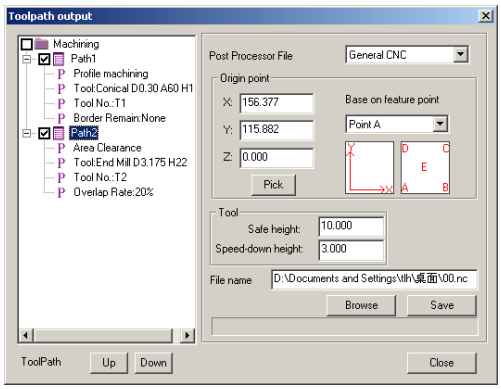
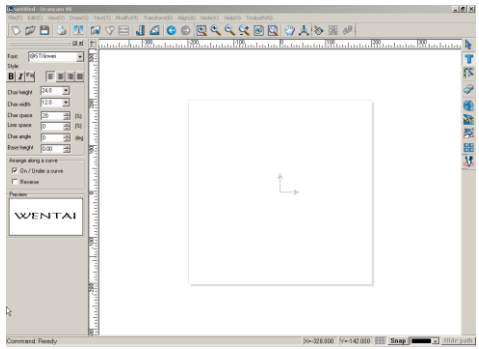


Fig. 11-9

Case2. Area Clearance

1 Launch Ucancam.

2 Click on the shortcut icon in **Editing Mode Bar** or click **Text->Text tools** command in the menu bar, and then the text editing menu is shown on the left of the drawing window. (Fig. 11-10)



F11-10

3 Type the letter “M” in the drawing window. (Fig. 11-11)

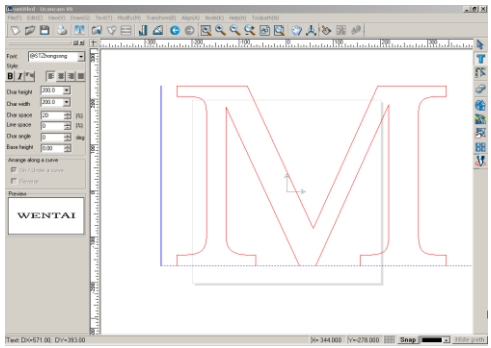


Fig. 11-11

4 Select the letter to edit it. (You should choose the font, set values of height, width, character space,

line space, character angle, and base height here.) The result is shown in Fig. 11-12.

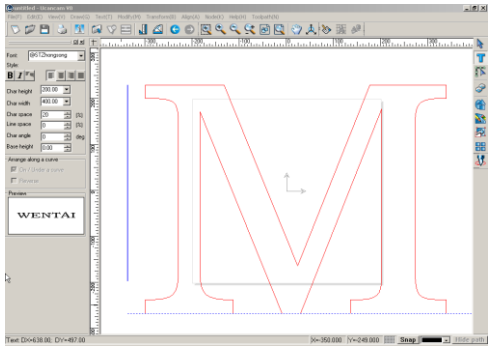


Fig. 11-12

5 Exit text editing status, and select the letter. Then click on the shortcut icon on **Transform Bar** or select **Transform->Scale** command in the menu bar, and a dialog is shown. You can change the size of the letter.

6 Click on the shortcut icon on **Curve Bar** or select **Draw->rectangle->rectangle** command in the menu bar to draw a rectangle around the letter. (Fig. 11-13)

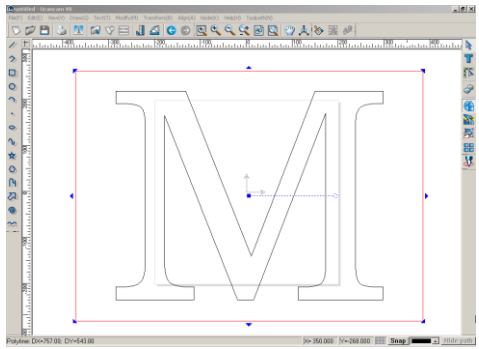


Fig. 11-13

7 Press **Ctrl** + **A** or click **Shift** key to select the two objects one by one, then click on the shortcut icon on **Aligning Bar** or click **Align->Align center** command in the menu bar . The result is shown in Fig. 11-14.

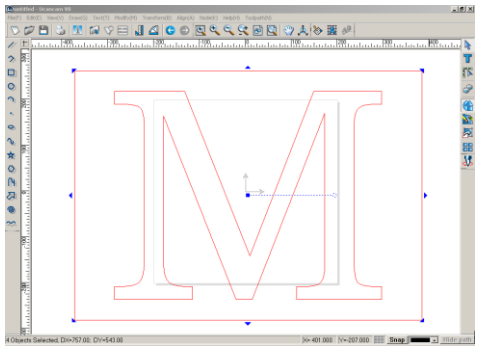


Fig. 11-14

8 Select the rectangular frame, and click on the shortcut icon in **Modification Bar** or click **Modify->Offset** command in the menu bar. Then a dialog is shown (Fig. 11-15). Set the **Offset distance** at 7, choose inner direction, and the result is shown in Fig. 11-16.

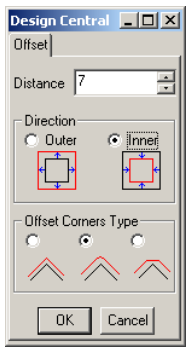


Fig. 11-15

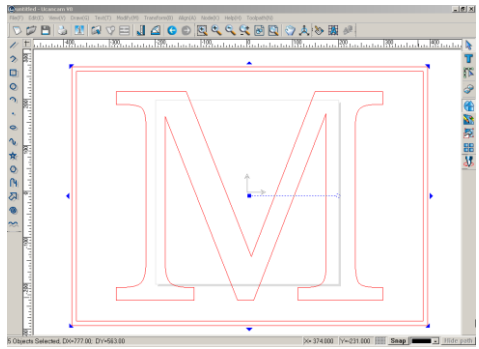


Fig. 11-16

9 Select the inner rectangle and repeat step 8 (set the offset direction at 2and choose **inner direction**). The result is shown in Fig. 11-17.

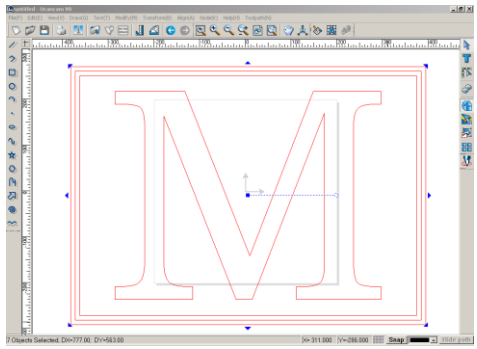


Fig. 11-17

10 Now we apply area clearance on the letter: select the letter, click on the shortcut icon in **Tool Path Bar** or click **Tool path->Area clearance** command in the menu bar. Then the dialog is shown. (Fig. 11-18) Choose a conical tool with a diameter of 0.3, angle of 15, blade height of 10, choose raster machining strategies (0 degree), a total depth of 0.2, overlap ratio of 40, anticlockwise. The result is shown in F11-19.

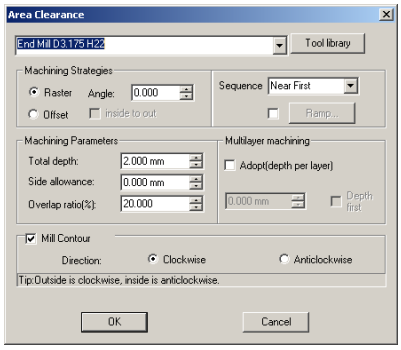


Fig. 11-18

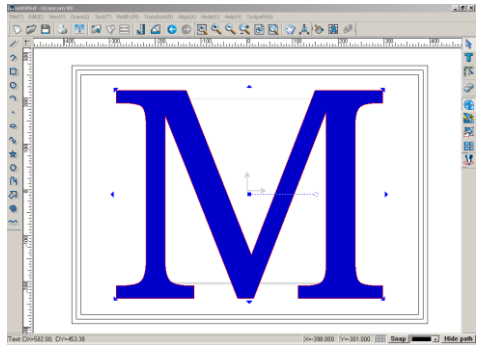


Fig. 11-19

11 Then apply area clearance on the two inner rectangles, with the parameters the same as in Step 10. (Fig. 11-20)

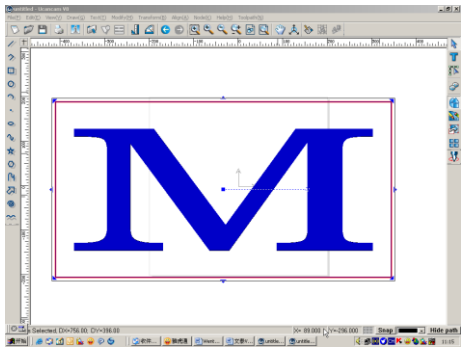


Fig. 11-20

12 Finally, cut the rectangle outside by profile machining. Select the outside rectangle, click on the shortcut icon on **Tool Path Bar**, and then a dialog is displayed. Select an end mill of 3.175, total depth of 1.2 (total depth is the thickness of the material), and anticlockwise machining. The result is shown in F11-21.

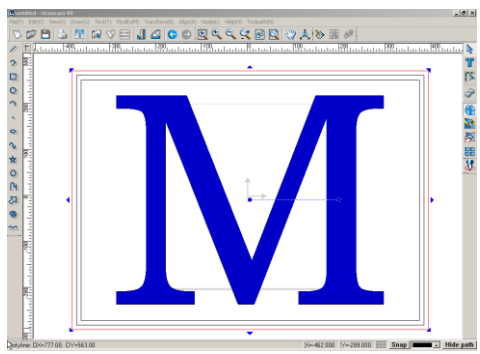


Fig. 11-21

13. Save the path: First save the tool path of profile machining of the outer rectangle with cutter lift height of 10, base on feature point A, and file name of “2.nc”; then save the tool path of area clearance, with cutter lift height at 5 and file name of “3.nc”.

In this way, you do not need to define the tool entry location when changing the tool so that the object can be output directly on the machine, thus improving machining efficiency and quality.

Case3. 3D Engraving

3.1 Top surface machining

1 Enter Ucancam.

2 Type the letter “M”. (Fig. 11-22)

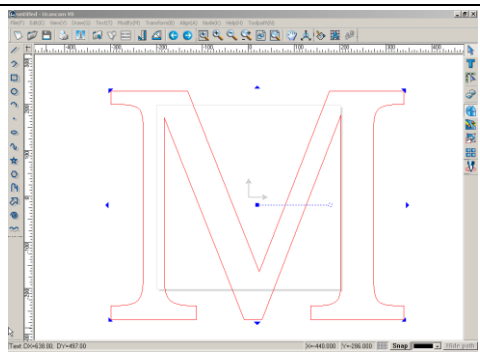


Fig. 11-22

3 Select the letter to edit it. Choose the font, character height, character width, and character space.

4 Adjust the scale of the letter.

5 Draw a rectangle around the letter, and choose align center.

6 Select the rectangle and the letter, and click on the shortcut icon in **Tool Path Bar** or select **Tool path->3D engraving** command in the menu bar. Then a dialog is displayed. (Fig. 11-23)

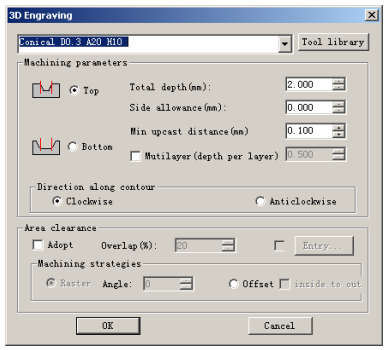


Fig. 11-23

Select a conical tool with diameter of 0.2, angle of 10, and height of 10, raster machining strategy (0 degrees), total depth of 5, overlap ratio of 40, anticlockwise, and select “Top” in **machining parameters**. Then the result is shown in F11-24.

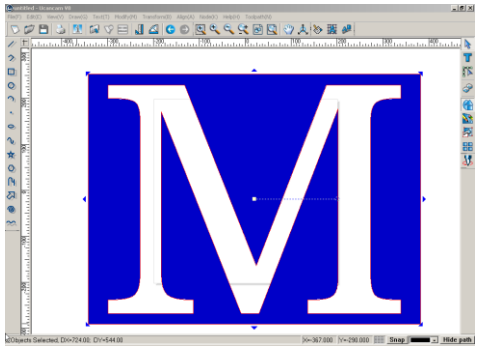


Fig. 11-24

7 Save the tool path: save the tool path with cutter lift height at 10, base on feature point A, and name the file 4.nc.

3.2 Bottom surface machining

The steps in bottom surface machining are the same as top surface machining.

Fig. 11-25 is the result of bottom surface machining.

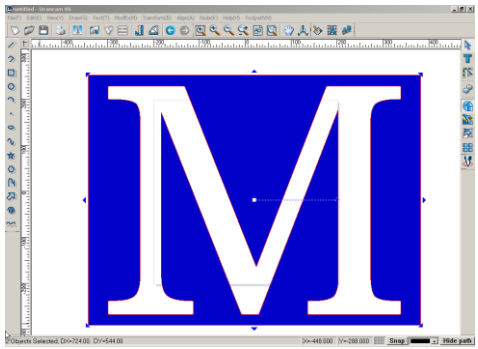


Fig. 11-25

Case4. Midline Machining

4.1 Midline machining in 2D

1 Launch Ucancam.

2 Type the letter “B”, and set the font, and the parameters of character height, width, space and line space. Then change the scale of the letter according to your requirement.

3 Select the letter, and click on the shortcut icon in **Tool Path Bar** or select **Tool path->Midline machining** command in the menu bar. Then the Midline machining dialog is shown. (Fig. 11-26) Select a conical tool with diameter of 0.2, angle of 45, height of 10, 2D, set total depth at 5, and choose **Reverse machining** and the result is shown in Fig. 11-27.

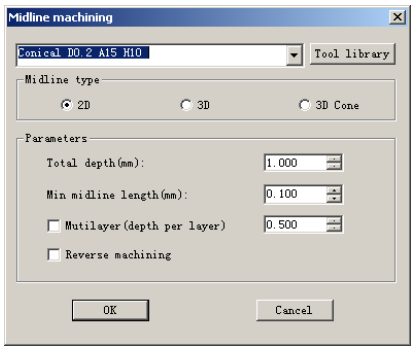


Fig. 11-26

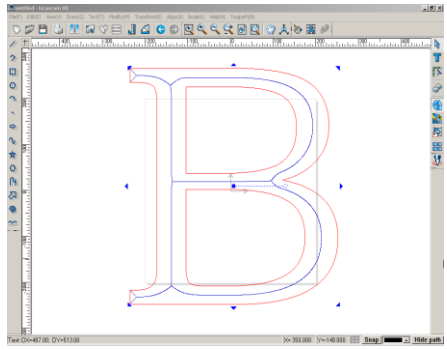


Fig. 11-27

4 Save the tool path: save the file with cutter lift height of 10, base on feature point A, and name as “file1.nc”.

4.2 Midline machining in 3D

1 Launch Ucancam

2 Input the letter “B”, and set the font, character height, character width, line space and character space. Change the scale of the letter according to your requirements.

3 Select the letter, and click on the shortcut icon in **Tool Path Bar** or select **Tool path->Midline**

machining command in the menu bar. Then the dialog is displayed. (Fig. 11-28)

Select a conical tool with diameter of 0.2, angle of 45 and height of 10, 3D, set total depth at 5, and select reverse machining. The result is shown in Fig. 11-29.

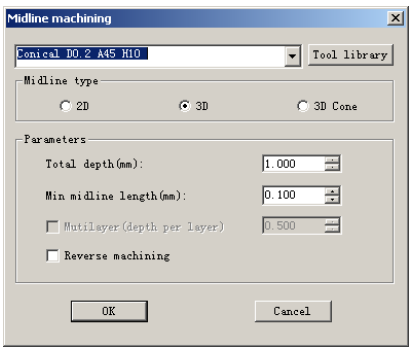


Fig. 11-28

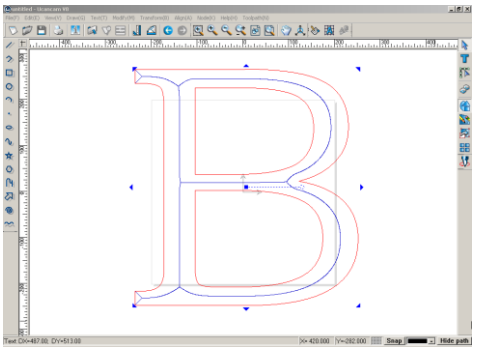


Fig. 11-29

4 Save the tool path: save the file with cutter lift height of 10, base on feature point A, and name of "file1.nc".

Case5. Simple Drilling

1 Launch Ucancam.

2 Draw an ellipse and a regular polygon. (Fig. 11-30)

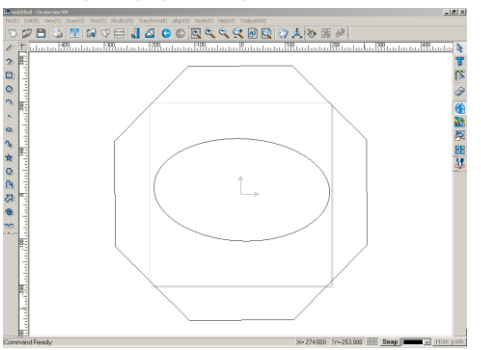


Fig. 11-30

3 Select the graph, and click on the shortcut icon on **Tool Path Bar** or select **Tool path->Simple drilling** in the menu bar and the simple drilling dialog is shown. (Fig. 11-31)

Select an end mill tool with diameter of 22, height of 10, set total depth at 5, point space at 44, choose **on curves**, and the result is shown in Fig. 11-32.

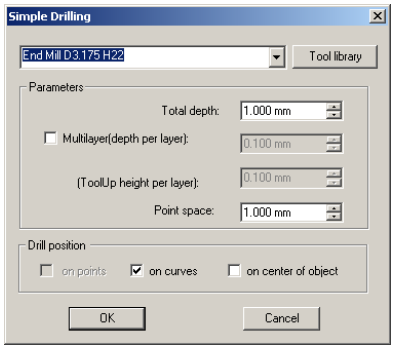


Fig. 11-31

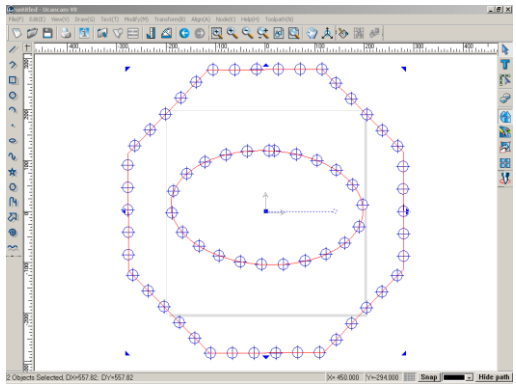


Fig. 11-32

4 Save the tool path: Save the file with cutter lift height of 10, base on feature point A, and name of "7.nc".

Case6. Insert And Inlay

1Launch Ucancam.

2 Choose a symbol from the **Symbol Library**, and adjust the sizes of it if necessary. (Fig. 11-33)

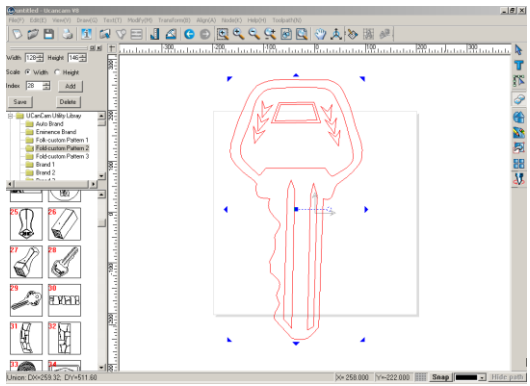


Fig. 11-33

3 Ungroup the graph, and select its outer contour. (Fig. 11-34) Click on the shortcut icon on **Tool Path Bar** or select **Tool path**->**Insert and Inlay**->**Insert machining** in the menu bar and the dialog in Fig. 11-35 is shown.

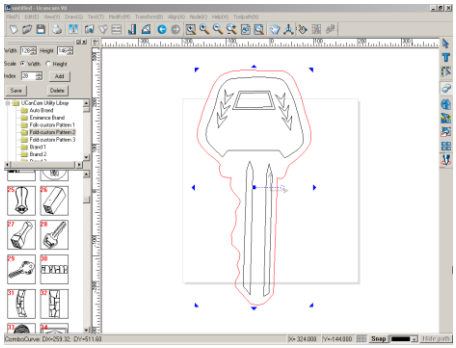


Fig. 11-34

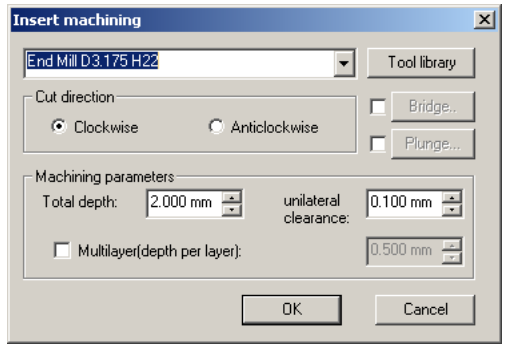


Fig. 11-35

4 Select an end mill tool with a diameter of 3.175 and height of 10, choose anticlockwise machining, set total depth at 10, interspace at 0.3, and the result is shown .(Fig. 11-36)

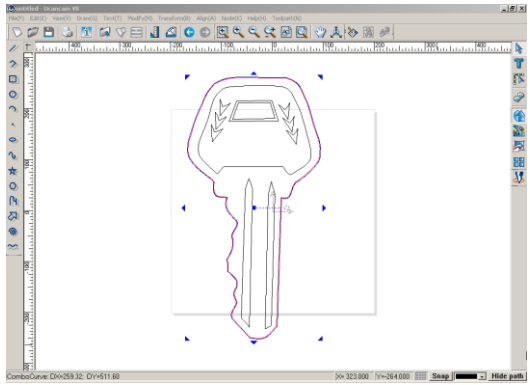
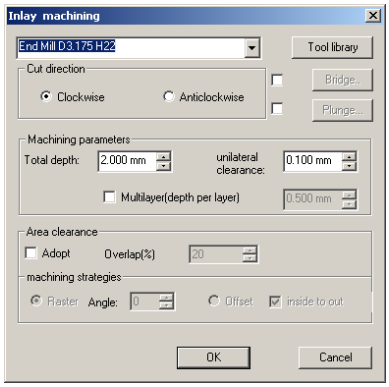
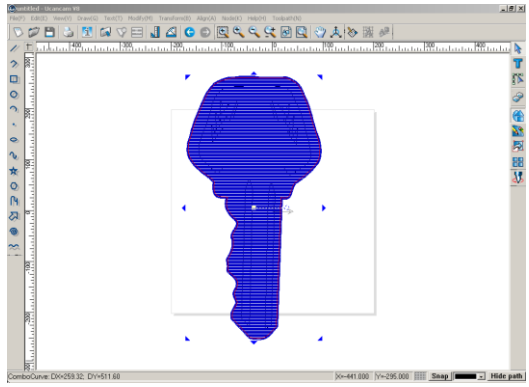


Fig. 11-36

5 Next we are going to make intaglio mould. Click on the shortcut icon on **Tool Path Bar** or select **Tool path**->**Insert and inlay**->**Inlay** command in the menu bar. The Inlay machining dialog is shown in Fig. 11-37. Choose a tool with diameter of 3.175 and height of 10, anticlockwise machining, total depth of 10, interspace at 0, overlap ratio of 80%, area clearance, and the result is intaglio. (Fig. 11-38)



F11-37



F11-38

6 Hide the path and select the whole object. Click on the shortcut icon on **Tool Path Bar** or select **Tool path**->**Area clearance** command in the menu bar and the Area clearance dialog is shown in Fig. 11-39. Select a tool with diameter of 0.2, angle of 15 degrees, height of 10, raster machining, total depth of 2, overlap ratio of 35, anticlockwise. The result is shown in Fig. 11-40.

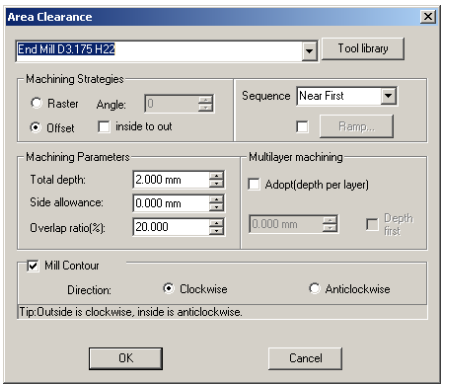


Fig. 11-39

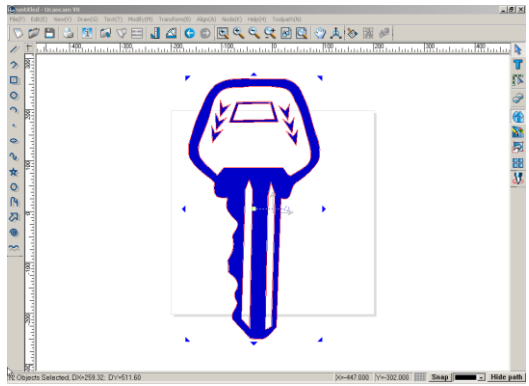


Fig. 11-40

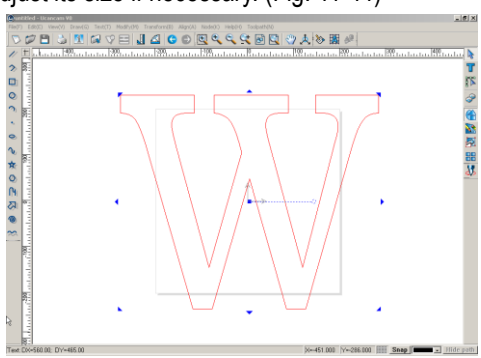
7 Save the tool path

Save the insert tool path file with a file named file1.nc, base on point A, cutter lift height of 10, and save the intaglio tool path with a file named file2.nc, not to select the feature point, cutter lift height of 10, and save area clearance tool path with file named file3.nc, not to select the feature point and cutter lift height of 10.

Case7. Prism Machining

1 Launch Ucancam.

2 Type the letter “W”, and adjust its size if necessary. (Fig. 11-41)



F11-41

3 Select the letter, and click on the shortcut icon in **Tool Path Bar** or select **Tool path->Prism machining** in the menu bar. Then the Prism dialog is shown. (Fig. 11-42)

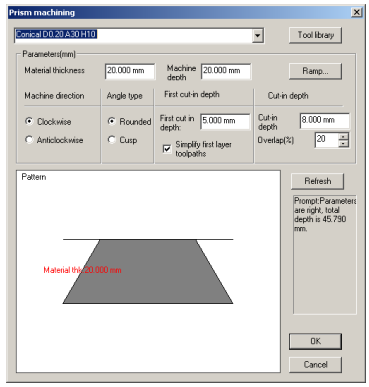


Fig. 11-42

Select a conical tool with a diameter of 0.2, height of 10 and angle of 45, material thickness of 20, first cut-in depth of 10mm, rounded angle, anticlockwise machining, and the result is shown in Fig. 11-43.

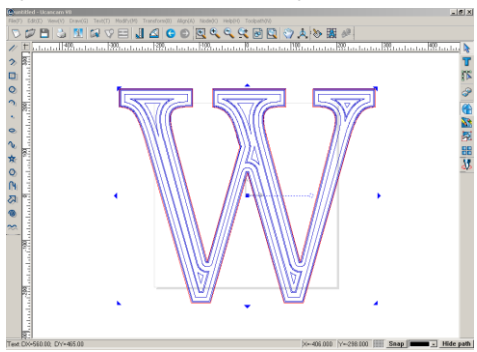


Fig. 11-43

4 Hide the tool path, and select the letter to cut the contour. Click on the shortcut icon in **Tool Path Bar**, and the profile machining dialog is shown. (Fig. 11-44) Select a tool with a diameter of 3.175, height of 10; choose outside cut position, total depth of 20, anticlockwise. Click on **OK**, and the result is shown in Fig. 11-45.

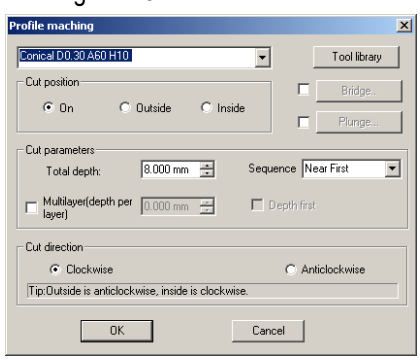


Fig. 11-44

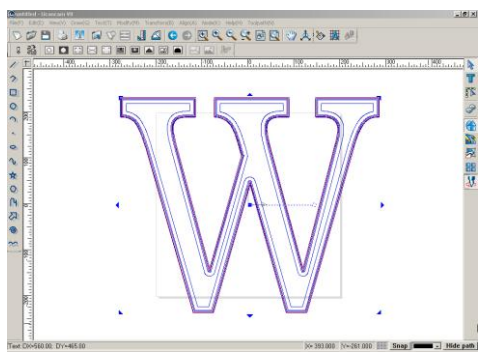


Fig. 11-45

5 Save the tool path: save the prism machining tool path with the file named file1.nc, base on feature point A, cutter lift height of 10, and save the tool path of profile machining with file named file2.nc, not to select the feature point and cutter lift height of 10.

Case8. Intelligent Machining

1. Launch Ucancam.
2. Select a symbol from the **Symbol library**, and adjust its size if necessary. (Fig. 11-46)

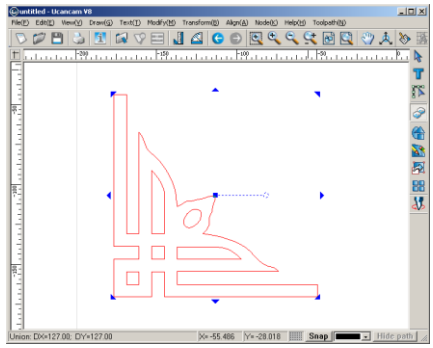


Fig. 11-46

3 Select the symbol, and click on the shortcut icon on **Modification Bar** or select **Modify**-> **Array duplication** command in the menu bar. Then the Array Duplication dialog is displayed. (Fig. 11-47)

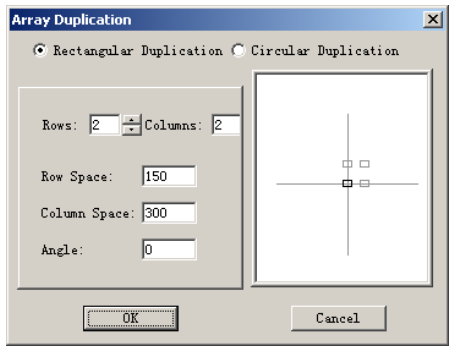


Fig. 11-47

Select **Rectangular duplication**, and set row space and column space at 150 and 300 respectively, rows at 2, column at 2, and then click on **OK** to end the setup. The result is shown in Fig. 11-48.

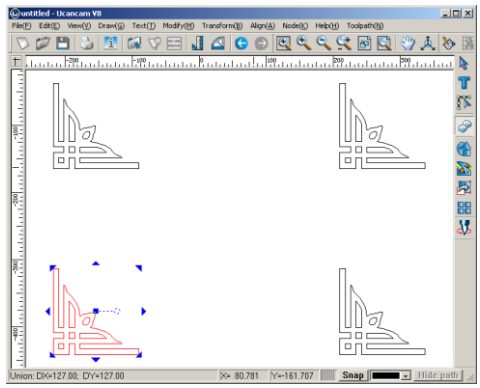


Fig. 11-48

4 Horizontally mirror the symbol in the upper left corner, horizontally mirror and then vertically mirror the symbol in the upper right corner, and vertically mirror the symbol in the lower right corner. The result is

shown in Fig. 11-49.

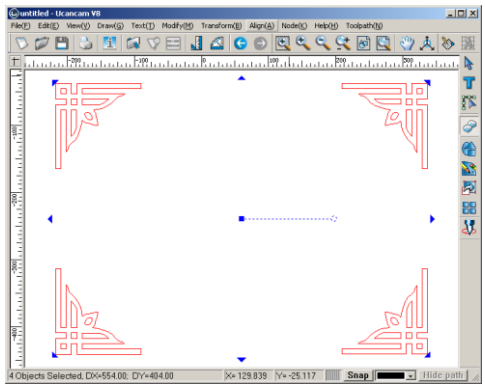


Fig. 11-49

5 Select two more symbols from the **Symbol library**, and change the size of the symbol to make X value into 100. Align and group the symbols, and the result is shown in Fig. 11-50.

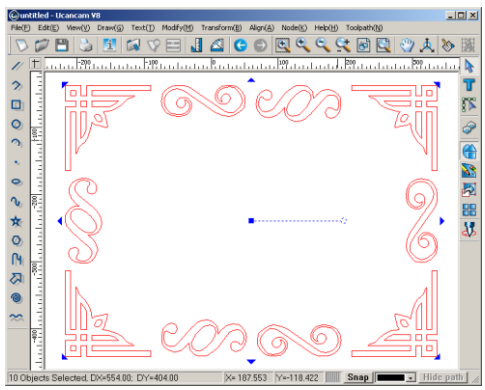


Fig. 11-50

6 Select another symbol from the **Symbol library**, and change the size of the symbol to make Y axis value into 200. The result is shown in Fig. 11-51.

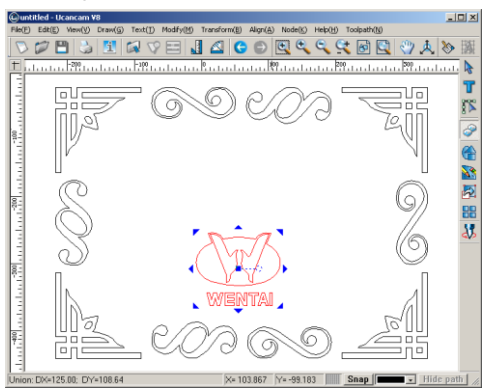


Fig. 11-51

7 Press **Ctrl** + **A** key in the keyboard to select all the graphs, align the center of the graphs, and the result is shown in Fig. 11-52.

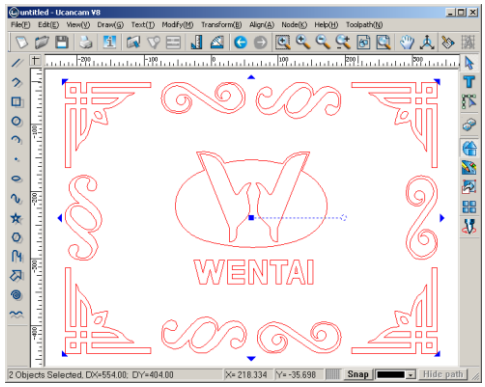


Fig. 11-52

8 Add a box around the symbol. (Fig. 11-53)

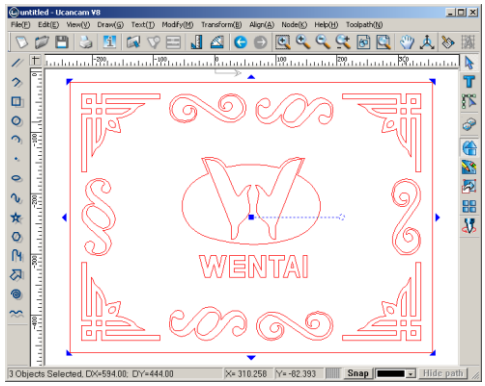


Fig. 11-53

9 Select all the symbols, and click on the shortcut icon on **Tool Path Bar** or select **Tool path->Intelligent machining** command in the menu bar. Then the Intelligent machine dialog is displayed. (Fig. 11-54)

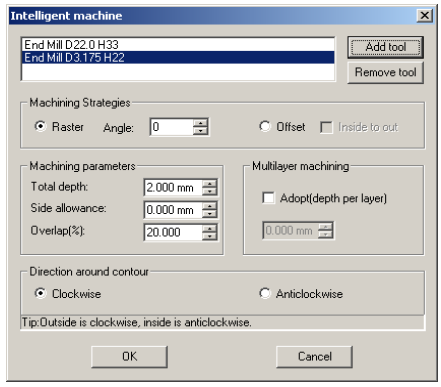


Fig. 11-54

10 Select two end mill tools with diameter of 3.175 and 22 respectively, choose machining depth of 3mm, overlap ratio of 60%, and choose anticlockwise. The result is shown in Fig. 11-55.

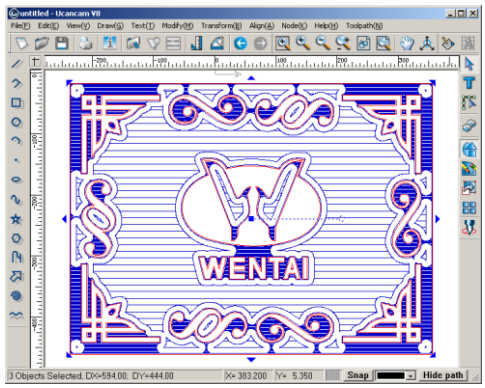


Fig. 11-55

11 Select the outer box, and apply profile machining to it. Select an end mill tool with a diameter of 3.175, height of 22, outside machining, total depth of 10, anticlockwise machining. Click on **OK** to get the result. (Fig. 11-56)

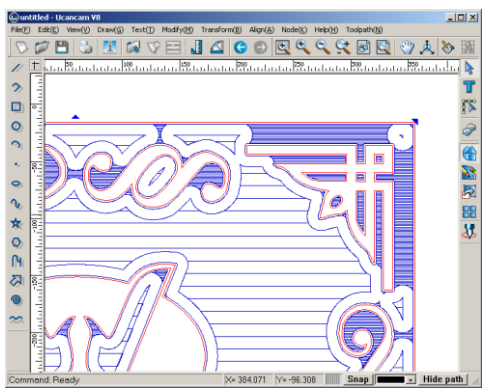


Fig. 11-56

12 Save the path: save the profile machining path with file named of file1.nc, base on feature point A, cutter lift height of 10, and save the intelligent tool path with the file named file2.nc, not to pick the feature point, and cutter lift height of 10.

Case9. Embossing Machining

1 Launch Ucancam.

2 Import an object. (Fig. 11-57)

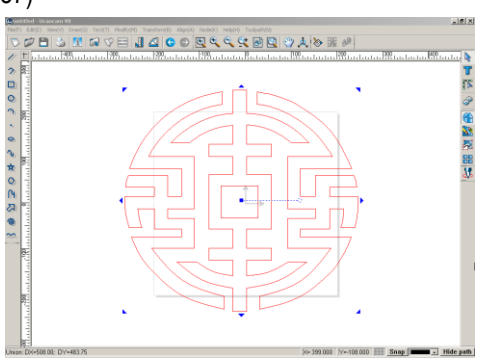


Fig. 11-57

3 Click on the shortcut icon on **Tool Path Bar** or click **Tool path->Embossing machining** command in the menu bar. Then the Embossing machining dialog is displayed. (Fig. 11-58)

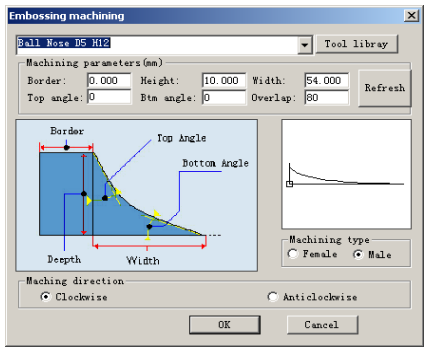


Fig. 11-58

4 Select a ball nose tool with a diameter of 2 and height of 12, and set the value of border at 2, height at 8, width at 19.774, top and bottom angles at 0 respectively, overlap ratio at 80%, and choose anticlockwise machining. The result is shown in Fig. 11-59.

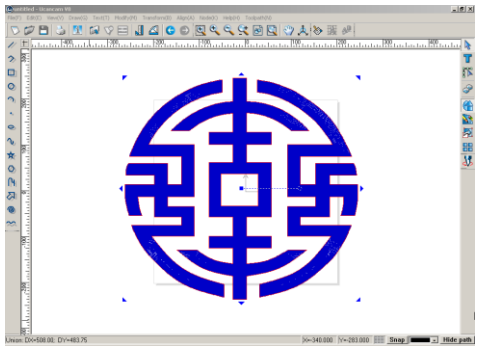


Fig. 11-59

5 Hide the tool path, and select the graph for area clearance. Select an end mill tool with a diameter of 3.175 and height of 10, total depth of 8, overlap ratio of 80%, and choose anticlockwise machining. The result is shown in Fig. 11-60.

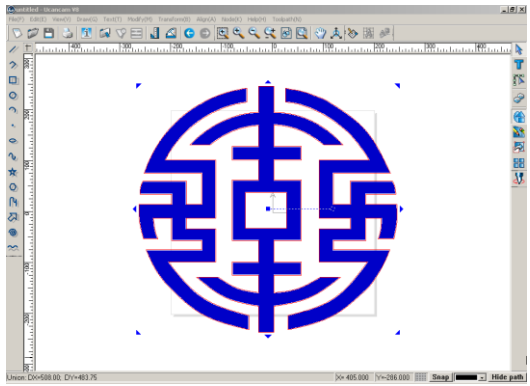


Fig. 11-60

6 Save the tool path: save the profile machining tool path with the file named file1.nc, base on feature point A, and cutter lift height of 10; save the area clearance tool path with file named file2.nc, not to select

the feature point, and cutter lift height of 10; save the embossing machining tool path with file named file3.nc, not to pick the feature point, and with cutter lift height of 10.

Case10. Image FM/AM Machining

1 Launch Ucancam.

2 Click on the shortcut icon on **Standard Bar** or click **File->Import** command in the menu bar to import an image. The Import file dialog is shown. (Fig. 11-61)

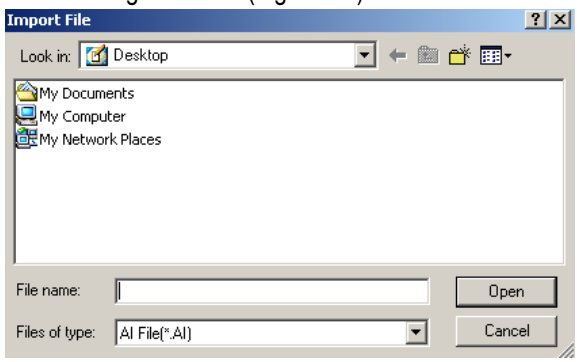


Fig. 11-61

3 Select an image in BMP format and open it. Adjust the size of the image to set X and Y both at 100, then the result is shown in Fig. 11-62.

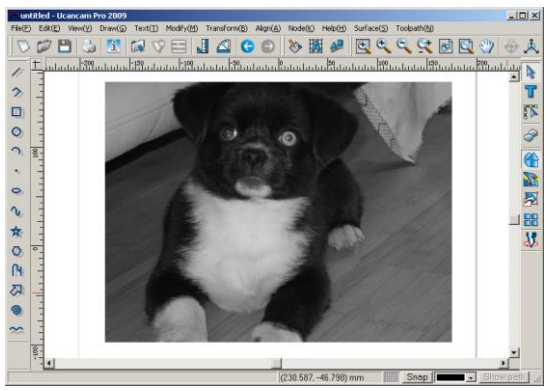


Fig. 11-62

4 Select the graph, and click on the shortcut icon in **Tool Path Bar** or click **Tool path->Image AM machining** command in the menu bar. Then the Image dot machining dialog is shown. (Fig. 11-63) Select a conical tool with a diameter of 0.3, angle of 15 degrees and height of 10, and set the horizontal and vertical space at 1 respectively, min brightness of 0.1, max brightness of 1.2, then the result is shown in Fig. 11-64.

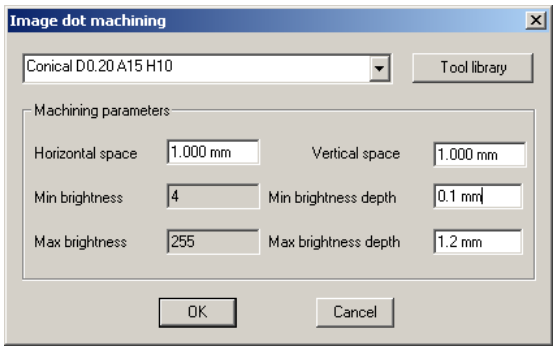


Fig. 11-63

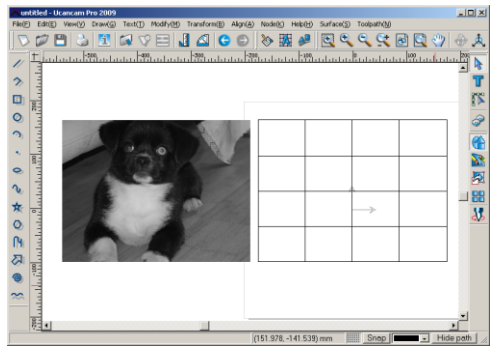


Fig. 11-64

5 Click **View->3D View** in the menu bar and then click on the right mouse button to select **ISO view** from the context menu. (See Fig. 11-65)

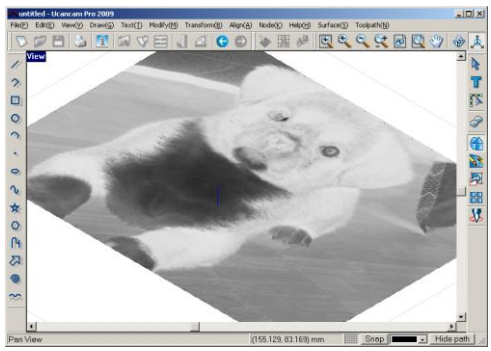


Fig. 11-65

6 Save the path: save the tool path with cutter lift height of 3, base on feature point A.

Case11. Image Relief Machining

1 Launch Ucancam.

2 Import an image and change the size to make X value into 100. The result is shown in Fig. 11-66.

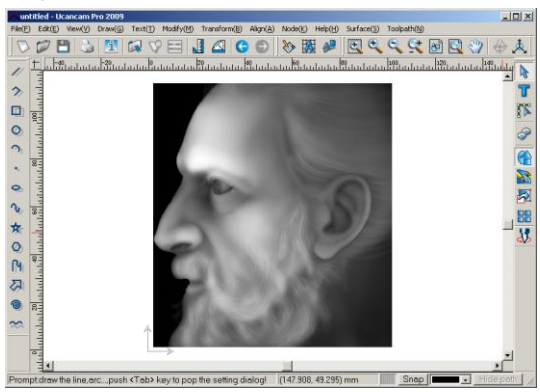


Fig. 11-66

3 Select the image, and click on the shortcut icon in **Tool Path Bar** or select **Tool path->Image relief machining** command in the menu bar. Then the Image relief machining dialog is displayed. (Fig. 11-67)

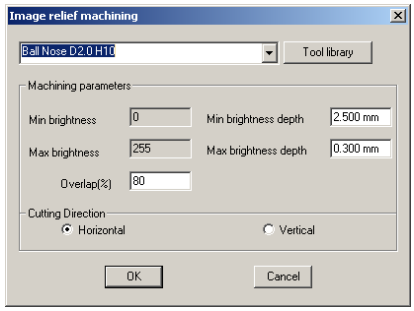


Fig. 11-67

Select a ball nose tool with a diameter of 2 and height of 12, choose min brightness of 2.5, max brightness of 0.1, overlap ratio of 80%, horizontal machining, and the result is shown in Fig. 11-68.

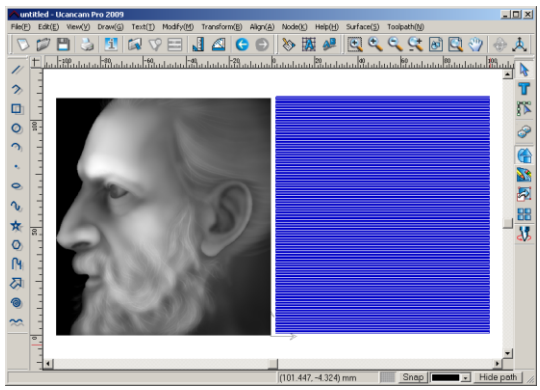


Fig. 11-68

4 Click **View->3D View** in the menu bar, and then click on the right mouse button and select **ISO View** from the menu. The result is shown in Fig. 11-69.

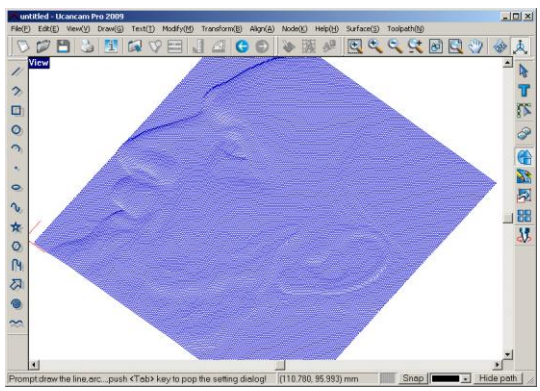


Fig. 11-69

5 Save the tool path: save the tool path with cutter lift height of 5, base on feature point A..

12. WAVE BOARD

Beijing Wentai Technology corp. has successfully launched UCanCAM V9 wave board cad/cam software, making it easy for customers to design not only lines, curves, waves, and other designs which already exist on the market, but also new designs by editing or trimming. Besides, you can also trim out characters or graphs on waves, achieving unbelievable effect.

The following shows the ways to make these wave designs in UCanCAM V9.

12.1 Texture

1) Draw a straight line (Fig. 1), then draw a curve. The straight line the tool path on X and Y axis, and the curve determines the depth of the texture, which is the Z axis tool path. The wave height is the distance from the top to the bottom point of the wave. (Fig. 2)

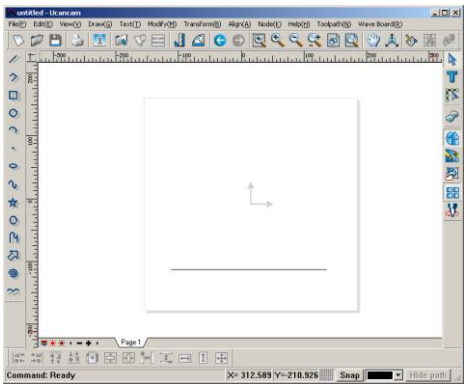


Fig. 1

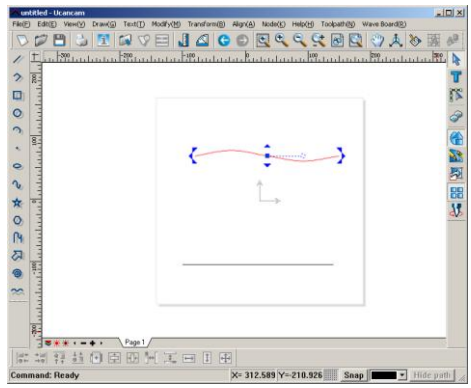


Fig. 2

Note: It is recommended to use curve when making textures.

2. Select the straight line, and then click **wave board** -> **texture** on the menu bar. A dialog is displayed. (Fig. 3)

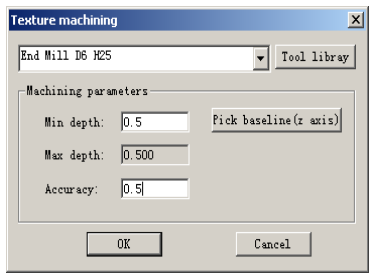


Fig. 3

3. Select a suitable tool, and set min depth, max. depth and accuracy, and then click with left mouse button on **Pick baseline (z axis)**. Then select the curve we have drawn. (Fig. 4)

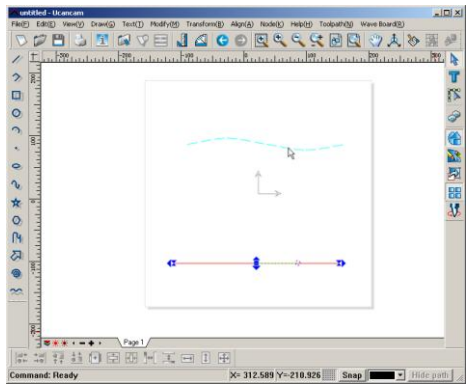


Fig. 4

4. Click on OK to create the tool path. View the tool path in 3d view, then we get the clear effect. (Fig. 5)

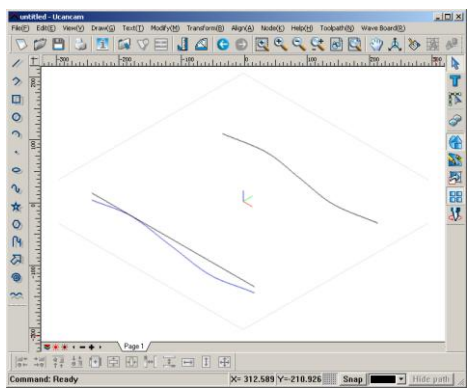


Fig. 5

Next, we are going to make a wave board with textures.

1. Draw two straight lines that are parallel to each other, and draw two curves that are symmetrical. (Fig. 6)

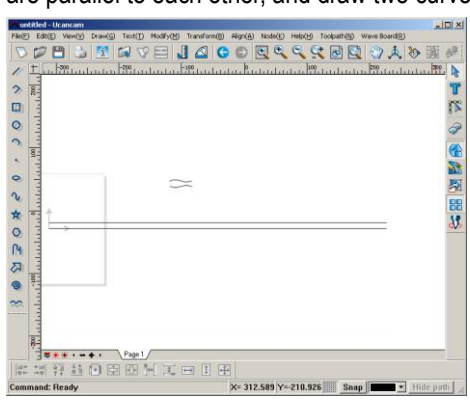


Fig. 6

2. Create tool paths for each pair of the two lines. Select one curve as baseline of one straight line, and select the other curve as the baseline of the other. The tool path is shown in Fig. 7.

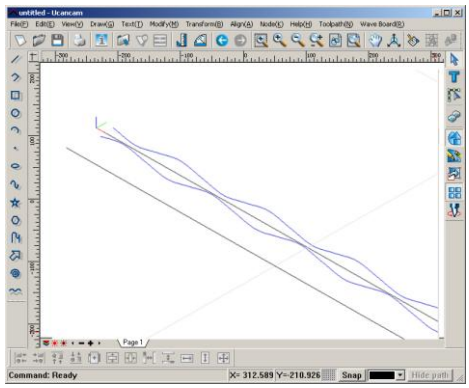


Fig. 7

3. Duplicate the tool path. (Fig. 8)

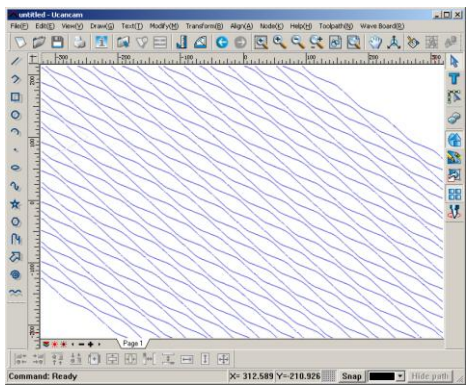


Fig. 8

12.2 Straight Texture

Click on **wave board** -> **straight texture**, and then the dialog is displayed. (Fig. 9)

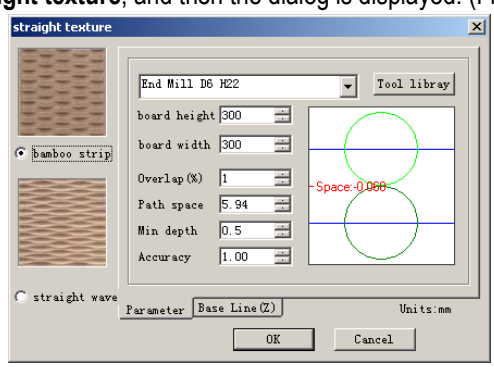


Fig. 9

Next we are going to explain the settings in this dialog.

Machining settings

Board height: the height of the board to be processed

Board width: the width of the board to be processed

Overlap: the proportion of the overlapped tool path to the last one

Path space: the space between each tool path

Min depth: the min depth the tool goes into the board

Accuracy: the accuracy of the texture. The accuracy is better when the setting is lower, and the time needed for calculating is longer.

Note: Overlap and the path space are the same. So you need to just set one of them when creating the tool path.

Baseline setting (Fig. 10)

Height: the height of the z axis curve that is the depth of the tool going into the material.

Height = min depth + wave height

Width: the width of z axis curve

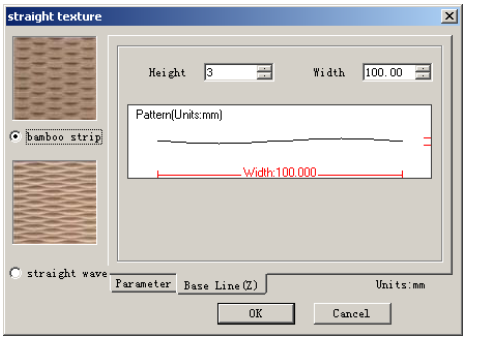


Fig. 10

Bamboo strip (Fig. 11)

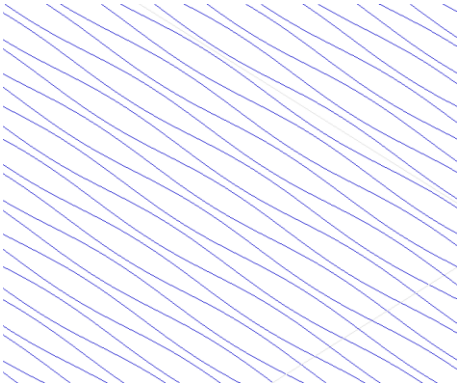


Fig. 11

Straight wave (Fig. 12)

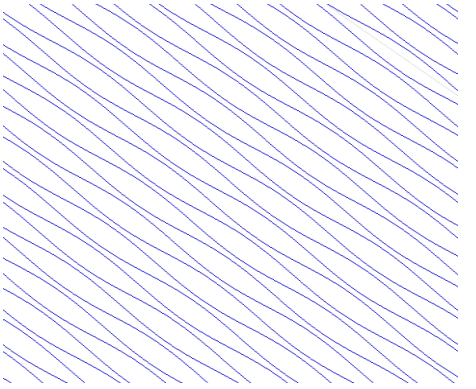


Fig. 12

12.3 Curvilinear texture

Click on **wave board** -> **curvilinear texture,** and a dialog is displayed. (Fig. 13)

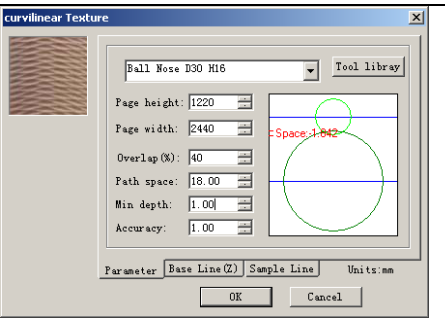


Fig. 13

Machining settings are the same as straight texture.

Baseline settings

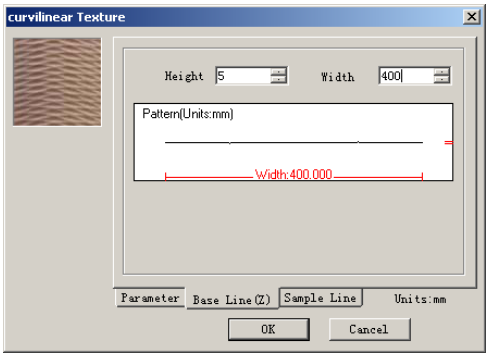


Fig. 14

Sample line settings (Fig. 15)

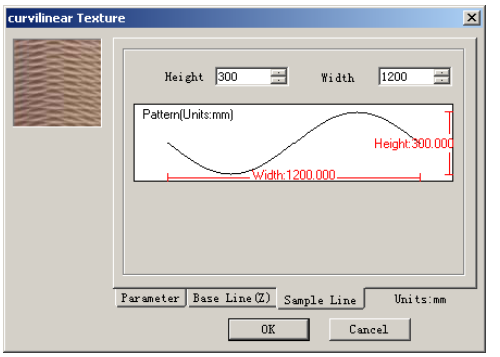


Fig. 15

Height: the height of X axis curve.

Width: the width of Y axis curve.

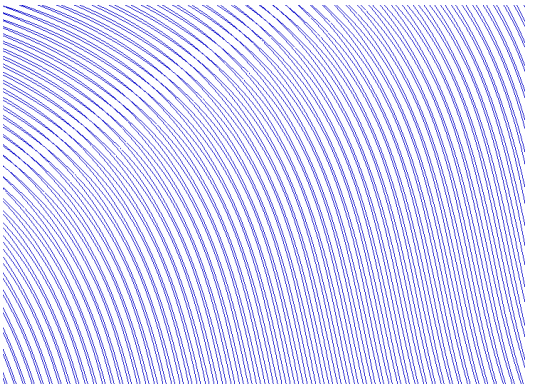


Fig. 16

12.4 Wave

Click on **wave board** -> **wave,** and a dialog is displayed. (Fig. 17)

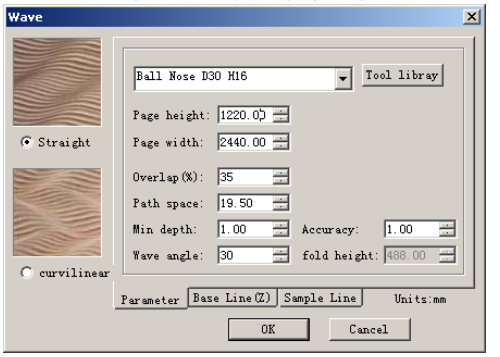


Fig. 17

Wave angle: the angle of the machining path of the curve

Fold height: the height of the wave fold

Baseline parameters （Fig. 18）

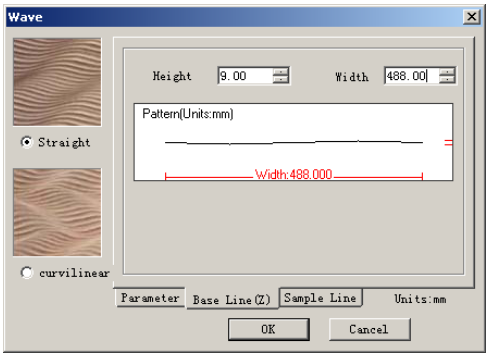


Fig. 18

Sample line parameters （Fig. 19）

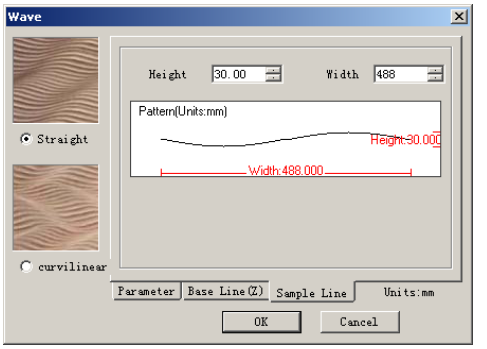


Fig. 19

Machining settings are the same as curvilinear texture. （Fig. 20）

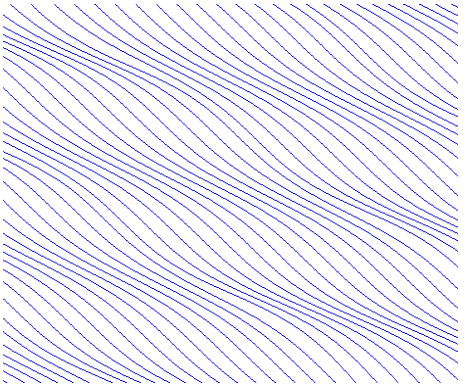


Fig. 20

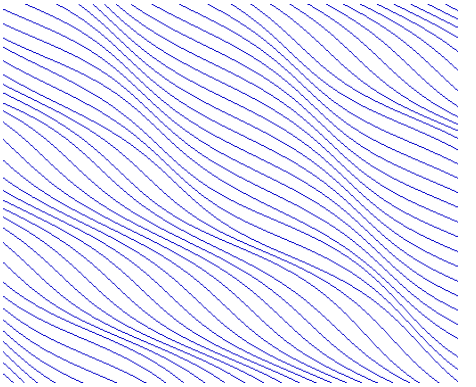


Fig. 21

12.5 Silk Texture

Silk texture is a kind of solid wave boards.

There are three ways to make silk textures.

1. Middle wider: the texture start to become narrow on the two ends, the middle part is the widest.

2. Start wilder: the texture is wildest at the beginning, and then goes lower.

3. End wilder: the texture is wildest at the end, just the opposite of Start wilder.

Draw some anomalistic curves and lines. (Fig. 22)

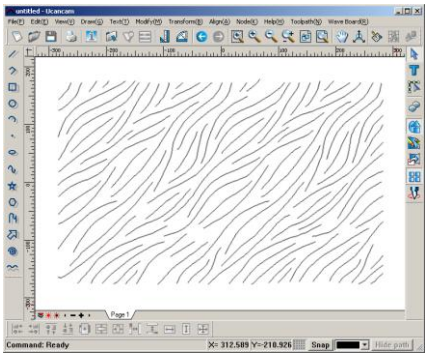


Fig.22

Select all the lines and curves, and then click wave board -> silk texture from the menu bar. A dialog is displayed. (Fig. 23)

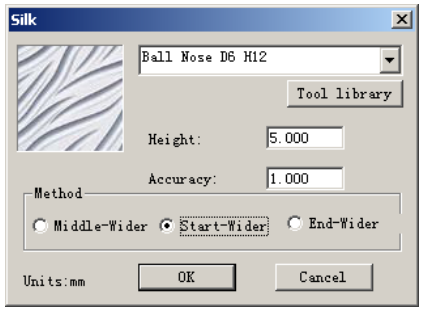


Fig. 23

Set the parameters in the dialog to create tool path, and then click on **OK**. (Fig. 24)

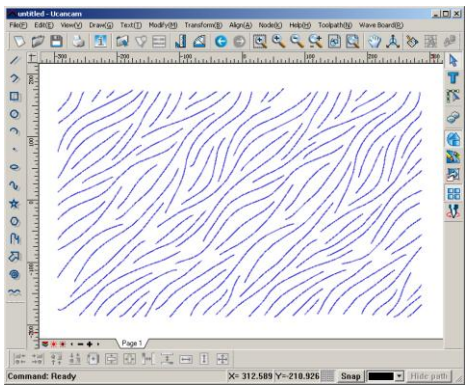


Fig. 24a

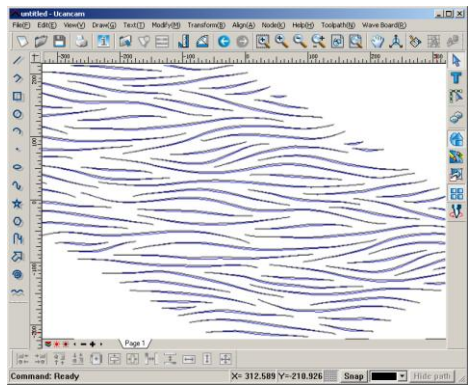


Fig. 24b

12.6 Texture Trimming

Sometimes we need to make a rectangle from the tool path of the wave board (Fig. 25), at this time, we need to use texture trimming function.

Click on **wave board**-> **texture trimming** on the menu bar, and a dialog is displayed. (Fig. 26)

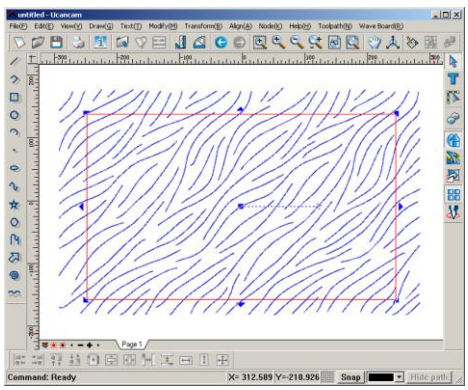


Fig. 25

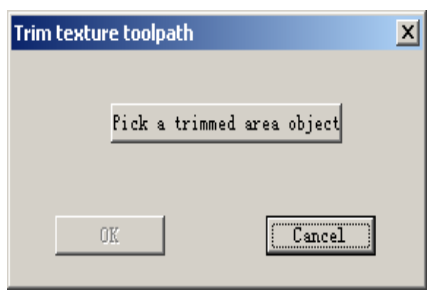


Fig. 26

Click on Pick a trimmed area object, and then the screen displays the main window panel. Move the mouse, when the rectangle becomes blue, click on the left mouse button. Then a dialog is displayed. (Fig. 27)

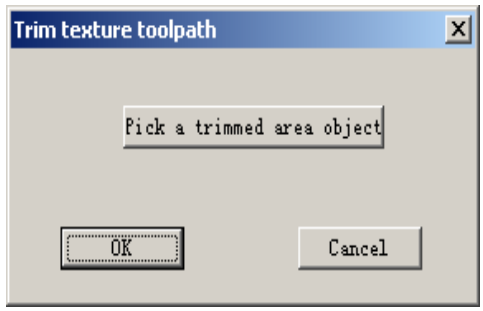


Fig. 27

Click on OK to finish the operation, then the following result is shown. (Fig. 28)

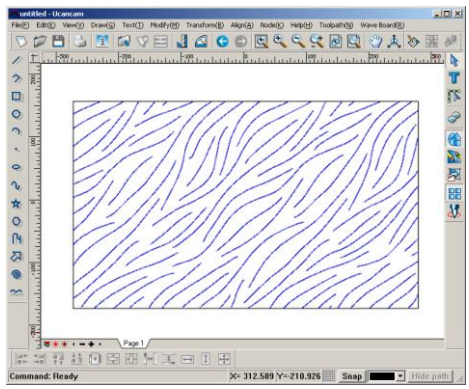


Fig. 28

After creating the tool path, click on tool path-> toolpath output on the menu bar to save it. Then you can start the machining.

Besides the above-mentioned waves, you can also create new ones by the editing, trimming, modification and other functions in UCanCam V9 software.

Ucancam Post Processor

the Post Processor is a programme which converts the tool path in some standard neutral format into the format requried by a specific machine control system. For example the G code format supported wordwide by many control systems and PLT3D suported by Roland machine.

Because the wide range of control system on the market, the majority of controls have simple formatting requirments. And therefore UCancam supply a configurable post processor which can be used by customers or agents to create a post proceesor file to support their controls.This configurable post proceesor use an unicode ASCII configration file to specify the output format required.

An example of a configuration file is shown on the below:

```
//////////////////////////////
FORMAT <X|X%1.3f |1.0>
FORMAT <Y|Y%1.3f |1.0>
FORMAT <Z|Z%1.3f |1.0>
FORMAT <S|S%d |1>
FORMAT <F|F%d |1>
UNITS <MM>
////////
FILE_EXTENSION <nc>
//////////////////////////////
PROG_HEAD <G90G17G21>
TOOLCHANGE <M06 T$TN>
PROG_TAIL <M30>
```

Briefly, the entries in configuration flie fall into four main categories which can be described as below

1. Global Statements
   These determine the file extensions, whether the output is in mm or inches.
   Line numbering information and formattong for numeric fileds

2. Head of Pogramme
   This section deals with line that must be output at the head of every programme.This information usually has the programme name, command for switching on the spindle etc.
   for example：
   PROG_HEAD <%:$DATE：$TIME>
   PROG_HEAD <G90G17G21>
   The word suffix “$” is variable.

3. Tail of Pogramme
   This section deals with line that must be output at the tailof every programme. This information usually has the programme name, command for switching off the spindle etc, moving the tool

back to the home position.

for example :

PROG_TAIL <M30>

PROG_TAIL <%>

4. TOOLCHANGE

If the machine tool is equiped with an automatic toolchanger, or user wants to allow manual tool changes through an output file.this statement can be used to ouput the appropriate commans.

For example：

TOOLCHANGE <M05>

TOOLCHANGE <M06 T$TN>

(TN: current tool number)

The schema of configuration file is : **KEY WORD < description/value>**

First word in the line is key word that is defined by Ucancam like as **UNITS**.

These in the brackets contain the description for command or values. For example : UNITS <MM>. To define the output is in milimeter.

The key word in Ucancam include two type:the one is to deinfe the commands.

The other is variable that is referenced in post processor file with prefix “$”

The following is the key word for commands

KEY WORD	**Specification**
FORMAT	to define the formatting fornumeric fields
PROG_HEAD	head of programme
PROG_TAIL	tail of programme
TOOLCHANGE	tool change command
G00_DEF	commamd name for rapid moving
G01_DEF	commamd name for line cutting
G02_DEF	commamd name for CW arc cutting
G03_DEF	commamd name for CCW arc cutting
G20_DEF	commamd name for inch unit
G21_DEF	commamd name for mm unit
SPN_CW	commamd name for spindle CW rotation
FILE_EXTENSION	File extension name
UNITS	Unit for length
XYZ_SEQ	Sequence for XYZ
LINE_NUM_START	The start line number
LINE_NUM_INCREMENT	Line number increment
LINE_NUM_MAXIMUM	Maximum value for line number
OMIT_SAME_GCODE	Omit the same G code
OMIT_SAME_XYZ	Omit the same XYZ value

RAPID_MOVE_XY_Z	Sequency for rapid moving
ARC_TO_LINES	Convert arc to lines
END_OF_LINE	The string at the end of line

The following is the key word for variable

KEY WORD	**Specification**
DATE	Date of create file
TIME	Time of vreate file
FILENAME	File name
XSIZE	Toolpath size for x axis
YSIZE	Toolpath size for y axis
ZSIZE	Toolpath size for z axis
XMIN	Toolpath minimum value for x axis
YMIN	Toolpath minimum value for y axis
ZMIN	Toolpath minimum value for z axis
XMAX	Toolpath maximum value for x axis
YMAX	Toolpath maximum value for y axis
ZMAX	Toolpath maximum value for z axis
X_CURPOS	Current x position
Y_CURPOS	Current y position
Z_CURPOS	Current z position
LN	Line number
TN	Tool number
TOOL_DESC	Tool description
FC	Feedrate for cutting
FR	Feedrate for rapid moving
SPN_SPEED	Spindle rotation speed
SAFE_Z_POS	Safe height

FORMAT

Output firmat for Variable in UCancam include :

FORMAT <N|N%d >

FORMAT <X|X%1.3f |1.0>

FORMAT <Y|Y%1.3f |1.0>

FORMAT <Z|Z%1.3f |1.0>

FORMAT <S|S%d |1>

FORMAT <F|F%d |1>

FORMAT <I|I%1.3f |1.0>

FORMAT <J|J%1.3f |1.0>

FORMAT <K|K%1.3f |1.0>

FORMAT <R|R%1.3f |1.0>

FORMAT <A|A%1.3f |1.0>

The field in brackets are separated as three parts by character "|" .eg:

FORMAT <X|X%1.3f |1.0>, the first part is Key character of Ucancam , "X" mean the current format is for x coordinate. Ucancam key characters of format include : N X Y Z S F I J K R A.

N: line number.
X: x cordinate
Y: y cordinate
Z: z cordinate
S: spindle rotation speed
F: spindle feedrate
I: arc x increment value
J: arc y increment value
K: arc z increment value
R: arc radius
A; angle for rotation axis

The second part is the string to print before value when output。 %**1.3f** is format string to control the number of decimal places leading zero etc. "1" is number that specifies minimum number of characters output. "3" is the precision specification value that specifies maximum number of characters printed for all or part of the output field

5.G00_DEF、G01_DEF、G02_DEF、G03_DEF、G20_DEF、G21_DEF

Define the command string name that repace for ISO G Code G00 ,G01, G02, G03, G20, G21. Eg: **G00_DEF <G172>**

6. Arc commad

1）ARC_TO_LINES <1>
Possible value: 1 or 0
Convert the arc to lines.
Default: 0

2）the format of arc output
FORMAT <I|I%1.3f |1.0>
FORMAT <J|J%1.3f |1.0>
FORMAT <K|K%1.3f |1.0>

Or
FORMAT <R|R%1.3f |1.0>

If set the IJK format in the post processor file, the ouput for arc is in IJK format。 If set the R format, the ouput for arc is in R format.

Default: R format

7.line numbering

FORMAT <N|N%d >

There are two meanings:

(1) output the line number.if not set this statement, ucancam do not output line number.

(2) Set the format of line number

LINE_NUM_START <1>

Start line number

Default: 1

LINE_NUM_INCREMENT <1>

Increment line number

Default: 1

8.UNITS

Possible value: MM or INCH

MM: All position in mm, feed in mm/min

INCH: All position in inches, feed in inches/min

9.FILE_EXTENSION

Defines the file extension that is used for files created with toolpath output.

10.Rotary_AXIS

This is used only in post processor which are used to drive a machine using rotary axis.

Possible value: X or Y

Either the X oy Y coordinate is mapped to rotary axis.

If this staement is present , Ucancam will display the dialog which show the

Diameter of rotary axis, the default value for diameter is assume that complete the length of toolpath along the axis being wrapped is the circumference of the cylinder.

11.OMIT_SAME_GCODE

Possible value: 1 or 0

Omit the following same G code in output file .

Default: 0.

Eg: G01 x010.000 Y 20.000 Z0.000

G01 x010.000 Y 20.000 Z-5.000

if set the statement : OMIT_SAME_GCODE <1>

the ouput is :

G01 x010.000 Y 20.000 Z0.000

x010.000 Y 20.000 Z-5.000

12.OMIT_SAME_XYZ

OMIT_SAME_XYZ <1>

Possible value: 1 or 0.

Omit the folowing same xyz coordinate.
Default: 0.

Eg: G01 x010.000 Y 20.000 Z0.000
G01 x010.000 Y 20.000 Z-5.000

if set the statement : OMIT_SAME_XYZ <1>
the ouput is :
G01 x010.000 Y 20.000 Z0.000
G01 Z-5.000

13.RAPID_MOVE_XY_Z

Possible value: 1 or 0
If setthe statement : RAPID_MOVE_XY_Z <1> , the rapid move of tool from PointA(0,0,10) to point pointB(100,50,0) isseperated I n two part, firstly from pointA(0,0,10) to midpoint(100,50,10), second ly from midpoint(100,50,10) to pointB(100,50,0).

14.XYZ_SEQ

Possible value: XYZ, XZY, YXZ, YZX, ZXY, ZYX.
This statement specifies the sequence of point coordinate is printed out .

15.END_OF_LINE

This statement specifies the character ouput at the end of line.
Default: none.

16.XSIZE、YSIZE、ZSIZE

The size of The toolpath in x axis, y axis, z axis.

17.XMIN、YMIN、ZMIN、XMAX、YMAX、ZMAX

The minimum and maximun value of the toolpath

18.X_CURPOS、Y_CURPOS、Z_CURPOS

Current tool point coordiant

19.SPN_SPEED

Spindle rotation speed.

20.FC

Tool feedrate for cutting

21.FR

Tool feedrate for rapid moving.

22.SAFE_Z_POS

Safe height.

The following is example of pots processor file:

Eg1：general CNC

//line number
//FORMAT <N|N%d >
////////////////////

```
FORMAT <X|X%1.3f >
FORMAT <Y|Y%1.3f |1.0>
FORMAT <Z|Z%1.3f |1.0>
FORMAT <S|S%d |1>
FORMAT <F|F%d |1>
////////////////////////////////
UNITS <MM>
////////////////////////////////
FILE_EXTENSION <nc>
////////////////////////////////
LINE_NUM_START <1>
LINE_NUM_INCREMENT <1>
////////////////////////////////
PROG_HEAD <G90G17G21>

TOOLCHANGE <M06 T$TN>

PROG_TAIL <M30>
```

Eg2：HP_PLT3D

```
  //precision    = 0.025,      1/0.025=40
FORMAT <X|%1.0f, |40.0>
FORMAT <Y|%1.0f, |40.0>
FORMAT <Z|%1.0f |40.0>
////////////////////////////////////
UNITS <MM>
//convert arc into lines
ARC_TO_LINES    <1>
RAPID_MOVE_XY_Z    <0>
END_OF_LINE      <;>
////////////////////////////////////
FILE_EXTENSION <plt>
////////////////////////////////
  PROG_HEAD <IN;>
  PROG_HEAD <SP1>

G00_DEF <PU>
G01_DEF <PD>

TOOLCHANGE <SP$TN>

PROG_TAIL <SP0>
```